

3. SUGGESTION FOR THE FURTHER DEVELOPMENT

As already mentioned above, the basic mechanical logging technology is being mastered by counterparts and trainees. In order to take root and develop the technology in Java, there are a wide range of problems and some of them are still left unstudied or unsolved.

As the first two years have passed, the expert team like to raise some issues and suggestion, which it hopes, would be of great help for the further development of Java's mechanical logging technology as well as of MLP itself.

3.1 Continuation of Practice and Brushing-up of Technique

Although the trainees have almost mastered basic technique, it is preferable that they continue mechanical logging operation after the graduation in order to assure safety work and to improve productivity. It must be always reminded of that mechanical logging technique begins degeneration just since it is unused.

Although the allocation of the trainees after their graduation is dependant upon PERHUTANI's personnel policy, the expert team requests that at least two graduates and appropriate number of co-workers are allocated to each yarder at the PERHUTANI's logging sites, and that *one party (at least two graduates) remains in MLP to assist counterparts and to develop appropriate technology.* This will be of great help for the modernization of logging work in Java.

3.2 Skillful Co-worker

According to R/D the graduates are expected to become leaders of logging operation, then they need skillful co-workers in their sites (setting/withdrawal, loading/unloading, platform construction, etc.). Safety work and productivity of mechanical logging mainly depends upon the co-workers' skillfulness.

Although the expert team is aware of that rural community has its own employment customs and that PERHUTANI has its own recruitment policy, it requests PERHUTANI to secure long-term co-workers so as to cultivate *sufficient number of skillful co-workers.*

3.3 Appropriate Technology

While Japan has developed mechanical logging technology with the aim to set up capital-intensive logging system, that system is not yet acceptable to Java's forestry because plenty of labours are available there.

In this circumstance, less expensive logging operation can be achieved through division of area and/or combination of works between manpower and machinery, and/or introduction of cheaper equipments suitable for the Java's forestry.

For example, flat or gently-sloped sites with short skidding distance can accept manpower logging or tractor logging, and yarders are employed at steep and/or complicated terrain with skidding-up condition. Moreover to collect logs by manpower where collecting distance is not long, can improve the efficiency of yarder operation. In this way appropriate technology can be achieved by untiring study and trial-and-error. The expert team would like to emphasize that "Slow and steady wins the race".

3.4 Production Management

Logging work on which MLP is going to graduate PERHUTANI's officials is merely one chain of the over-all flow of log production.

When logs are supplied to a pulp/paper mill with large and constant quantity, production management must be improved so as to control and smoothed the over-all flow (yielding plan, felling, yarding/skidding, transport, marketing/inventory-management), and at the same time, critical paths which hamper the smooth flow must be improved so as that each chain can work at full extent.

Infrastructure (ex. transport system) must also be improved in line with production policy.

This big issue is far beyond the task of MLP, however it must be solved in the near future when the mechanical logging technology transferred by MLP is widely employed in Java.

3.5 Machinery Maintenance

Machinery maintenance is indispensable for the mechanical logging. The better maintenance is, for the longer and with the less trouble machineries work. That's why MLP has provided sufficient quantity of spareparts and tools and also the intensive course on maintenance. Moreover the expert team is requesting JICA to improve the maintenance course of the training in Japan.

Therefore PERHUTANI is requested to secure maintenance technicians, to systemize daily and periodical check of machineries, to improve maintenance facility, to organize logistics of spareparts and to raise the level of and utilize private repair-shops with a long term view, in order to make the mechanical logging take root in Java.

3.6 Research & Development and Human Resources

In order to ensure the development of mechanical logging technology in the long run, research & development must be strengthened and human resources must be developed.

Research subjects are, for example, as follows:

- (a) working system (party organization, bucking policy, etc.)
- (b) improvement of equipments.

- (c) physical analysis of pine tree (strength)
- (d) physical analysis of soil
- (e) durability of equipment (debritiation)

Human resources are developed, for example, by as follows:

- (a) to strengthen research.
It is preferable to nominate counterparts as researcher and to promote them as senior expert.
- (b) to cultivate technical adviser.
It is advisable to assign the graduates as technical adviser in the mechanical logging operation sites.
- (c) to cultivate skillful co-workers.
It is desirable to employ co-workers for long-term.
- (d) to integrate the human resource development.
It is highly requested to further strengthen the training system and/or organization in order to meet the forestry mechanization.

3.7 Short Comments by Experts

Each expert, except the team leader and liaison officer, has briefed his own comment on MLP based upon the experience working for MLP training course. The comments are formalized i.e.,

- (1) term of the expert
- (2) main field of the expert
- (3) target/guideline of the training
- (4) progress of the training
- (5) proposal

3.7.1 Mr. Handa

- (1) 20 April 1978 – 19 April 1980
- (2) General management of training course.
Elementary subject.
- (3) Effective implementation of the training.
Safety work.

(4) The majority of the first trainees have already mastered elementary subjects then they can operate sky-line logging by themselves. Some of the first trainees have still be remained less mastered. They are requested to pay further effort in the remaining term of the training course.

Safety have been sometimes seen ignored. Safety instruction must be repeated and strengthened.

(5) 18-month training course can cover only elementary logging operation. However real sky-line logging operation needs many kinds of variation. PERHUTANI is requested to remain some graduates in MLP to master further variation of sky-line logging.

Process control must be improved so as to smoothen the flow of work-chains i.e. felling, logging and transport.

As counterparts have improved their logging technology upto some extent, they are expected to become main instructions, while experts will assist them.

3.7.2 Mr. Shimoyama

(1) 25 July 1978 – 24 July 1980

(2) Logging technology.

(3) Repetition of practice.

To compose textbooks which systematize knowledge gained in lecture and practice. To modify technology and instruction method so as to fit custom, natural condition, sense of value and the like in Indonesia.

First priority on technology transfer, second priority on technology development.

(4) While training itself is being carried out along with programme properly, it is said that half of the trainees have mastered almost every logging technique and can operate logging by themselves but that remaining half has mastered only some parts of technique then seems not yet to be able to operate logging by themselves.

Coordination and/or arrangement of works is not yet satisfactorily understood.

Trainees still tend to overestimate capacity of yarder and tractor.

(5) MLP has often needed PERHUTANI HQ's authority to solve problems which occurred in Madiun, DF and MLOF, which sometimes took long time. It is preferable that MLP has its own authority, though not almighty, to solve daily problems.

Newly imported technology can develop there only when it can find large demand for its products. In this context it is strongly requested to develop pine wood market.

It is desired to operate logging with combination of manpower and machinery.

Machinery logging cost can be minimized when the machinery works at its full extent. In order that maintenance system must be developed.

3.7.3 Mr. Oyamada

(1) 25 July 1978 – 24 August 1980.

(2) Sky-line logging (responsible for practice at DF)

(3) To transfer Japan's standard sky-line logging technology. To form and keep team-work so as to well coordinate various works and so as to implement the training safely.

(4) Three quarters of trainees have more or less mastered the sky-line logging technique, while the remaining a quarter is still requested to pay more effort.

The first trainees will practice two or three variation of sky-line system besides endless-tyler system at MLOF. More opportunities of variation are requested for the second trainees.

(5) Although all the counterparts have experienced training in Japan for 3 months in the past three years, their technology is not yet sufficient. Therefore counterparts should be free from administrative works and concentrate on training activities.

Work programme arranged with KPH sometimes not executed at the logging site. It is hoped to deepen the communication between logging site and KPH.

It is desired that sky-line logging technology is soon widely employed in Java. Then it is hoped that a pulp and paper mill is constructed before long.

At present MLP uses large-scale yarders with the reason that a beginners' operation needs much reserve power to keep it safe. When sky-line logging is employed in Java small/middle scale yarder is preferable to lower logging cost.

As Java's pine forests are in many cases complicatedly surrounded by farm lands, it might sometimes more economical to use small scale tractor which can skid logs through farm road.

3.7.4 Mr. Sasaki

(1) 8 December 1978 – 7 December 1980

(2) Machinery maintenance.

(3) Machinery maintenance technique which is indispensable for daily logging operation. Assembly/disassembly, adjustment, repair and check of yarder and tractor.

(4) Majority of trainees have mastered ordinal machinery maintenance technique.

Machinery maintenance practice with 12 trainees has tended to produce some lookers-on. In order to avoid it and to make all the trainees participate the practice, important works were carried out by individual trainees.

(5) MLP has only one counterpart who is in charge of machinery. He is too busy in repairing project's vehicles and in other miscellaneous works to help experts at practice. It is strongly requested to make him free from non-training works and/or to increase counterparts specialized in machinery.

It is hoped that counterparts and trainees are promoted to higher position so as that they can spread mechanical logging technology more easily.

3.7.5 Mr. Ueno

(1) 25 July 1978 -- 24 July 1980

(2) Sky-line logging (responsible for practice at MLOF)

(3) Correct work process.
Elementary knowledge.
Fundamental work.
Coordinated work.
Safety work.

(4) At present each four-man group can set and withdraw sky-line system in 10 and 4 net working days respectively in average and yard 15 - 16 m³ logs in a net working day. These figures are fairly satisfying.

Individual setting/withdrawal works are mastered but coordination of works is not yet fully mastered.

All the trainees have already been well experienced in loading/unloading. Half of them can lead and supervise co-workers.

All the trainees can operate yarder/tractor properly.

Half of the trainees can arrange a work programme and instruct other trainees and co-workers to execute the programme.

(5) Counterparts are often occupied by non-training works. Some of first trainees who are going to complete 18-month training have the same level of technique as counterparts who experienced 3-month training in Japan but have less training time in MLP because of being busy in non-training works. In this circumstance it is hoped that some graduates of the first training course are promoted to counterpart or appointed as associate counterpart.

It is preferable to separate clearly KPH's logging work and MLP's on-the-job training from the view point of smooth and safe implementation of the MLP training course.

It is desired that pre-yarding work (= felling) and post-yarding work (= truck transport) are well harmonized, synchronized and coordinated with mechanical logging so as that the latter can work at its full extent.

Some accessories, spareparts and tool disappeared. This has hampered smooth implementation of the training. Strict care is necessary.

The first trainees have almost mastered sky-line logging technology with fairly satisfying level. Therefore now PERHUTANI is request to provide the graduates with mechanical logging operation sites where they can show and develop technology mastered in MLP training course.

3.7.6 Mr. Kokura

- (1) 24 August 1978 – 24 August 1980
- (2) Tractor logging.
Warehouse management.
- (3) Safety work.
Tractor skidding work.
Civil engineering work by tractor.
- (4) All the trainees can operate tractor (skidding and civil engineering work) completely, though not skillfully. Trainees still lack for sense of safety, goods management and work programme.

Half of the trainees have already mastered fundamental sky-line logging and can operate it by themselves.

- (5) It is preferable to separate manpower logging area and machinery logging area.

It is preferable that counterparts assigned to MLOF are responsible and have authority for the logging management of MLOF at least of logging area.

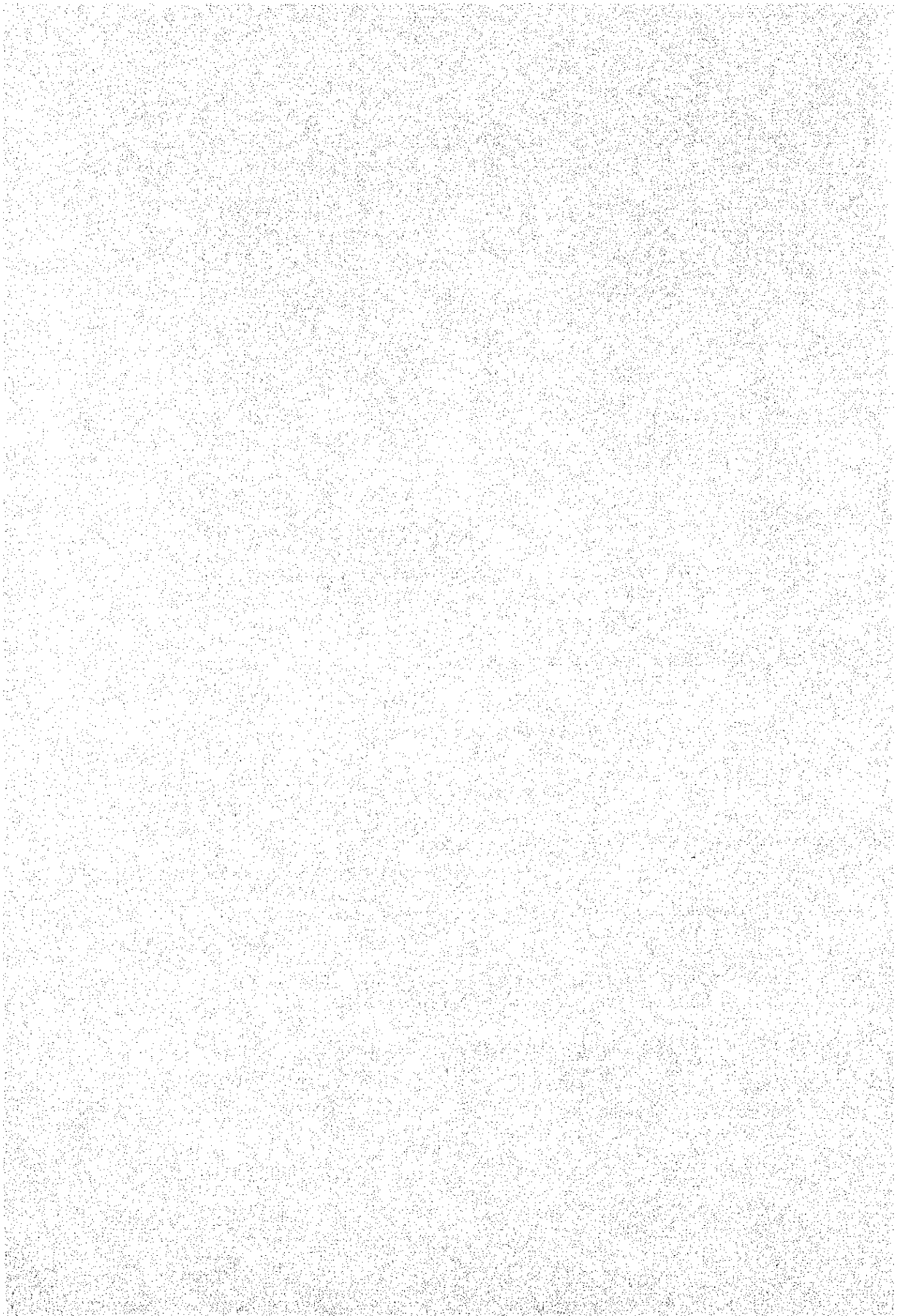
It is needed to set up maintenance and spareparts-supply system/organization in order that mechanical logging spreads in Java successfully.

As Java has a plenty of less expensive labours, it is desired to develop combination logging system of machinery and manpower.

It is hoped that counterparts and graduates are promoted with a view to give mechanical logging high priority so as to spread it easily.

In order to assure effective training, PERHUTANI is requested to select trainees who have strong health and elementary knowledge about mathematics and physics.

A N N E X



ANNEX I. SOEDJARWO LETTER

No.: 761/DJ/I/77

JAKARTA

LAMPIRAN:

March 26, 1977

PERIRAL:

To H.E. The Ambassador of Japan
The Republic of Indonesia
Jakarta

Excellency,

We are pleased to note that the cooperation between JICA and PERUM PERHUTANI on Forest Inventory for management and logging in Central Java is now under way and is expected to be finalized in the middle of this year.

In the meantime officials of JICA and PHRUM PERHUTANI have come to a conclusion that in order to prepare the necessary skills for mechanical logging in the mountainous Pine forests a "Mountain Logging Training Centre" would be necessary.

In this context we would propose a second technical cooperation between JICA and PERHUTANI so as to establish the above mentioned training centre.

We envisage the above mentioned cooperation briefly going among the following lines:

- 1) The Training Centre will give facilities for training to 15 - 20 students from PERHUTANI and the Forestry Service for periods of approx. 6 months.
- 2) The Japanese side is expected to provide the necessary machineries and equipment, vehicles and instructors and to finance construction of access roads to the operation area for training.
- 3) The Indonesian side is to provide working facilities such as space for office, lectures, work shop etc. (existing training facilities may be considered), counterparts and other personnel.
- 4) The cooperation will last for about 2 years starting from 1977.

We would appreciate it if we could hear of your decision soon.

Yours sincerely,

The Director General of Forestry
of The Republic of Indonesia

(SOEDJARWO)

cc cc:

1. Mr. Gempo Seojono, Head Bureau for International Cooperation, Sekretariat Negara.
2. Dr. Fr. Herman Haeruman, Chief Division of Natural Resources and Environment, Bappenas
3. Dr. In. Birowo, Chief Planning Bureau Ministry of Agriculture.

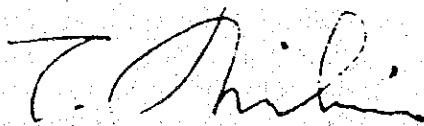
ANNEX II. RECORD OF DISCUSSIONS FOR MOUNTAIN LOGGING PRACTICE
IN JAVA

RECORD OF DISCUSSIONS
BETWEEN THE JAPANESE FORESTRY SURVEY TEAM
AND PERUM PERHUTANI CONCERNING TECHNICAL COOPERATION
FOR MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA,
ATA - 184 -

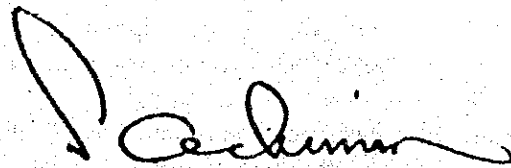
In pursuance of the preliminary survey which was conducted in June and July 1977, the Japanese Forestry Survey Team, organized by the Japan International Cooperation Agency (hereinafter referred to as JICA), and headed by Mr. Mishina visits the Republic of Indonesia from November 29 to December 9, 1977, for the purpose of discussing with PERUM PERHUTANI, State Forest Corporation of the Republic of Indonesia (hereinafter referred to as PERHUTANI), concerning the desirable measures to be taken by both Governments for the successful implementation of the Mountain Logging Practice Project.

As a result of the discussions, the Team and PERHUTANI agreed to recommend to their respective Governments to carry out the matters referred to in the attached document concerning the technical cooperation for the Mountain Logging Practice Project in Java, as a follow up of the Forest Inventory for Management and Logging for raw material supply to Central Java Pulp & Paper Mill.

Jakarta, December, 1977.



Tadao Mishina
Head of the Japanese Forestry Survey Team



Soekiman Atmosoedarjo
President Director of Perum Perhutani

MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA

ATTACHED DOCUMENT

1. (1) For the purpose of transferring mechanical logging technology for yielding pine-logs as raw material to be supplied from mountainous forests of PERHUTANI to a pulp and paper mill which is to be established at Notog, the Government of Japan and the Government of the Republic of Indonesia will cooperate with each other in implementing a technical cooperation for the Mountain Logging Practice Project in Java (hereinafter referred to as "the Project"). The master plan of the Project is specified in Annex I.
(2) The Project will be implemented in accordance with an annual work plan to be formulated by the Joint-Committee referred to in paragraph 8.
2. (1) In accordance with laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense the services of the Japanese experts as listed in Annex II through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
(2) In accordance with the laws and regulations in force in the Republic of Indonesia, the Japanese experts mentioned in (1) above and their families will be granted in Indonesia the privileges, exemptions and benefits as listed in Annex III within the frame work of the Colombo Plan Technical Cooperation Scheme.
3. (1) In accordance with laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at their own expense such equipment, machinery, vehicles, instruments, tools, spare parts and other materials required for the implementation of the Project as listed in Annex IV through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
(2) The articles mentioned in (1) above will become the property of the Government of the Republic of Indonesia upon being delivered C.I.F. to the Indonesian authorities concerned at the ports or airports of disembarkation, and will be utilized exclusively for the implementation of the project in consultation with the Japanese Team Leader listed in Annex II.
4. (1) In accordance with laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to receive at its own expense the Indonesian personnel engaged in the Project for technical training or study tour in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
(2) The Government of the Republic of Indonesia will take necessary measures through PERHUTANI to ensure that the knowledge and experience acquired by the Indonesian

- personnel mentioned in (1) above through technical training and study tour in Japan may be utilized effectively for the implementation of the Project.
5. (1) In accordance with laws and regulations in force in Indonesia the Government of the Republic of Indonesia will take necessary measures through PERHUTANI to provide at its own expenses:
 - (a) the services of the Indonesian technical officials and other personnel as listed in Annex V;
 - (b) land and building as listed in Annex VI as well as other incidental facilities required therefore;
 - (c) supply or replacement of articles necessary for the implementation of the Project other than those provided by the Government of Japan referred to in paragraph 3 (1);
 - (d) suitably furnished existing PERHUTANI housing accommodation for the Japanese experts and their families.
 - (2) In accordance with laws and regulations in force in Indonesia the Government of the Republic of Indonesia will take necessary measures through PERHUTANI to meet:
 - (a) customs duties, internal taxes and any other charges, if any, imposed in the Republic of Indonesia in respect of the articles referred to in paragraph 3 (1);
 - (b) expenses necessary for transportation within the Republic of Indonesia, of the articles referred to in paragraph 3 (1) as well as for the installation, operation and maintenance thereof;
 - (c) all operational expenses necessary for the implementation of the Project;
 - (d) expenses for transportation facilities of internal travel of the Japanese experts on duty.
 6. In accordance with laws and regulations in force in Indonesia the Government of the Republic of Indonesia undertakes to bear claims, if any arises, against the Japanese experts engaged in the Project resulting from, occurring in the course of, or otherwise connected with, the discharge of their official functions in the Republic of Indonesia, except for those claims arising from willful misconduct or gross negligence of the Japanese experts.
 7. The Director General of Forestry, Ministry of Agriculture of the Republic of Indonesia, will be responsible for the administrative matters for the implementation of the Project and the Japanese experts will provide technical advice and guidance for the implementation of the Project.
 8. For the successful implementation of the Project, a Joint Committee will be established as specified in Annex VII.
 9. (1) The period of the technical cooperation mentioned in this Record of Discussions will be three (3) years starting at the date of the arrival of the Japanese experts.

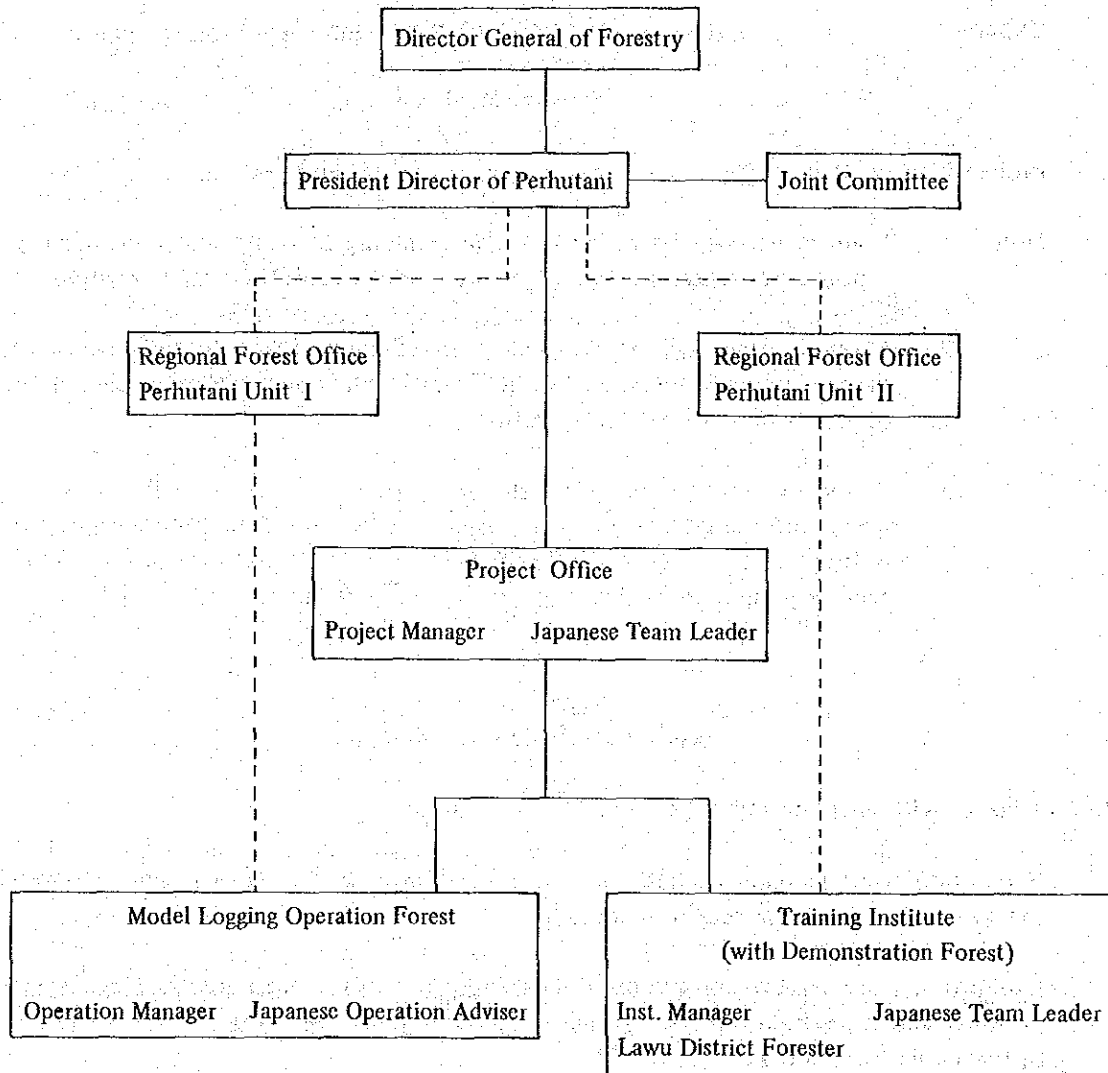
- (2) There will be mutual consultations between the authorities concerned of both Governments concerning the possibility of further cooperation thereafter.

Annex I.
THE MASTER PLAN OF THE PROJECT

The object of the Project is to develop and to practice mountain logging technology at the organization as shown in the attached chart.

1. A Project Office will be established in Madiun, and will control the implementation of the Project.
2. A Training Institute at Madiun and Demonstration Forests at Lawu will be established, and the lecture of basic theory and the elementary practice for mechanical logging system and repair work will be implemented there for 6 months.
3. A Model Logging Operation Forest approximately 2,000 ha will be established at Pekalongan Forest District, Central Java, and the practical training for mechanical logging operation after the lecture and practice mentioned in (1) above will be implemented there for 12 months.
4. In principle, practical training in the Model Logging Operation Forest, so called "on-the-job training" will be implemented under the supervision of PERHUTANI, and the Training Institute will dispatch requested instructors to the job site from time to time.
5. The synopsis of the training items are as follows, and details of the curriculum will be determined through discussion between the Japanese experts and their counterparts;
 - a. Design and practice of skyline-logging
 - b. Design and practice of tractor-logging
 - c. Design and practice of access road construction
 - d. Operation of forestry equipment/machinery
 - e. Maintenance of forestry equipment/machinery.
6. Graduates will work mainly as technical staff who will be the leader of logging operation in PERHUTANI's working sites.

Attached Chart
 Organization Chart for Indonesia – Japan Mountain Logging Practice Project



Annex II.
The Japanese Experts

<u>Category</u>	<u>Field of Specialty</u>
1. Team Leader	
2. Experts	Management of Logging Logging Forestry Machines
3. Project Liaison Officer	

- Note:
1. Team leader will be assigned to the Training Institute and concurrently be appointed as representative of Japanese side at Project Office in Madiun.
 2. Above experts will be assigned to the Training Institute and one of those experts will be nominated by the Team Leader concurrently as the operation adviser of Model Logging Operation Forest.
 3. Beside the above experts, short term experts for the same fields as well as wood/forest products processing, soil conservation, forest protection, reforestation, forest survey and other forestry technical fields may be dispatched, if necessary, upon mutual agreement by both parties.

Annex III.
Privileges, Exemptions and Benefits

(In accordance with laws and regulations in force in Indonesia)

1. Exemption from income tax and charges of any kind imposed on or in connection with the living allowance remitted from abroad.
2. Exemption from import and export duties and any other charges imposed in respect of personal and household effects for each expert which may be brought into the Republic of Indonesia from abroad.
3. Free local medical services and facilities to the Japanese experts and their families in accordance with the regulations applied to Indonesian Government officials.

Annex IV.
The Equipment, Machinery and Other Articles

1. Machinery, equipment and materials necessary for the sky-line logging.

2. Machinery, equipment and materials necessary for the tractor logging.
3. Machinery, equipment and materials necessary for the access road construction.
4. Machinery, equipment and materials necessary for the audio-visual and other lectures and practice.
5. Equipment, tools, spare parts and materials for repair work.
6. Vehicles.
7. Other necessary equipment, tools and materials to be mutually agreed upon.

Annex V.

Indonesian Technical Officials and Other Personnel

Category	Field
1. Project Manager	
2. Manager of Training Institute	
3. Operation Manager of Model Logging Operation Forests	
4. Counterparts	Management of Logging Logging Forestry Machine
5. Clerical and service personnel including typists, clerks and drivers.	
6. Laborers.	

Note: Number and period of service of the above mentioned officials and other personnel will be adjusted according to necessary from time to time.

Annex VI.

Land, Buildings and Facilities

1. Land
 - (1) Training Institute
 - a. Land for the buildings and facilities ("Perhutani Pusdiklat" buildings and

- facilities will be utilized).
- b. Demonstration Forest approximately 200 ha (Lawu Forest District)
- (2) Model Logging Operation Forest approx. 2,000 ha (West Pekalongan Forest District)
2. Buildings and Facilities
- (1) Project Office
 - (2) Training Institute
 - a. Lecture Room, Practical Training Room and Administrative Office.
 - b. Warehouse for Forestry Equipment/Machinery.
 - c. Workshop.
 - d. Garages.
 - e. Warehouse for Equipment and Materials.
 - f. Dormitory for Trainees.
 - g. Guest House.
 - h. Facilities in the Demonstration Forest such as Office Room, Warehouse for Machinery and Equipment, etc.
 - (3) Model Logging Operation Forest
 - a. Administration Office.
 - b. Dormitory for Instructors.
 - c. Garages.
 - d. Warehouse for Equipments and Materials.
 - e. Generator Houses.
 - f. Pump Houses.

Annex VII.

Composition of the Joint Committee

- | | | |
|----|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Chairman | President Director of PERHUTANI |
| 2. | Vice Chairman | Director of Programming
Directorate General of Forestry |
| 3. | Members | |
| | Indonesian side | <ul style="list-style-type: none"> 1) Project Manager 2) Manager of Training Institute 3) Representative of the Bureau of Planning,
Ministry of Agriculture |

Japanese side

- 1) Team Leader
- 2) Experts designated by Team Leader
- 3) Liaison Officer
- 4) Representatives of JICA

Note: An official of the Embassy of Japan may attend the meetings of the Joint Committee as an observer.

An official of the Government of the Republic of Indonesia assigned by the Director General of Forestry may attend the meetings of the Joint Committee as an observer.

ANNEX III. ATA-184

ATA-184

**FOREST INVENTORY FOR MANAGEMENT AND LOGGING PLAN
FOR RAW MATERIAL SUPPLY TO CENTRAL JAVA PULP & PAPER MILL**

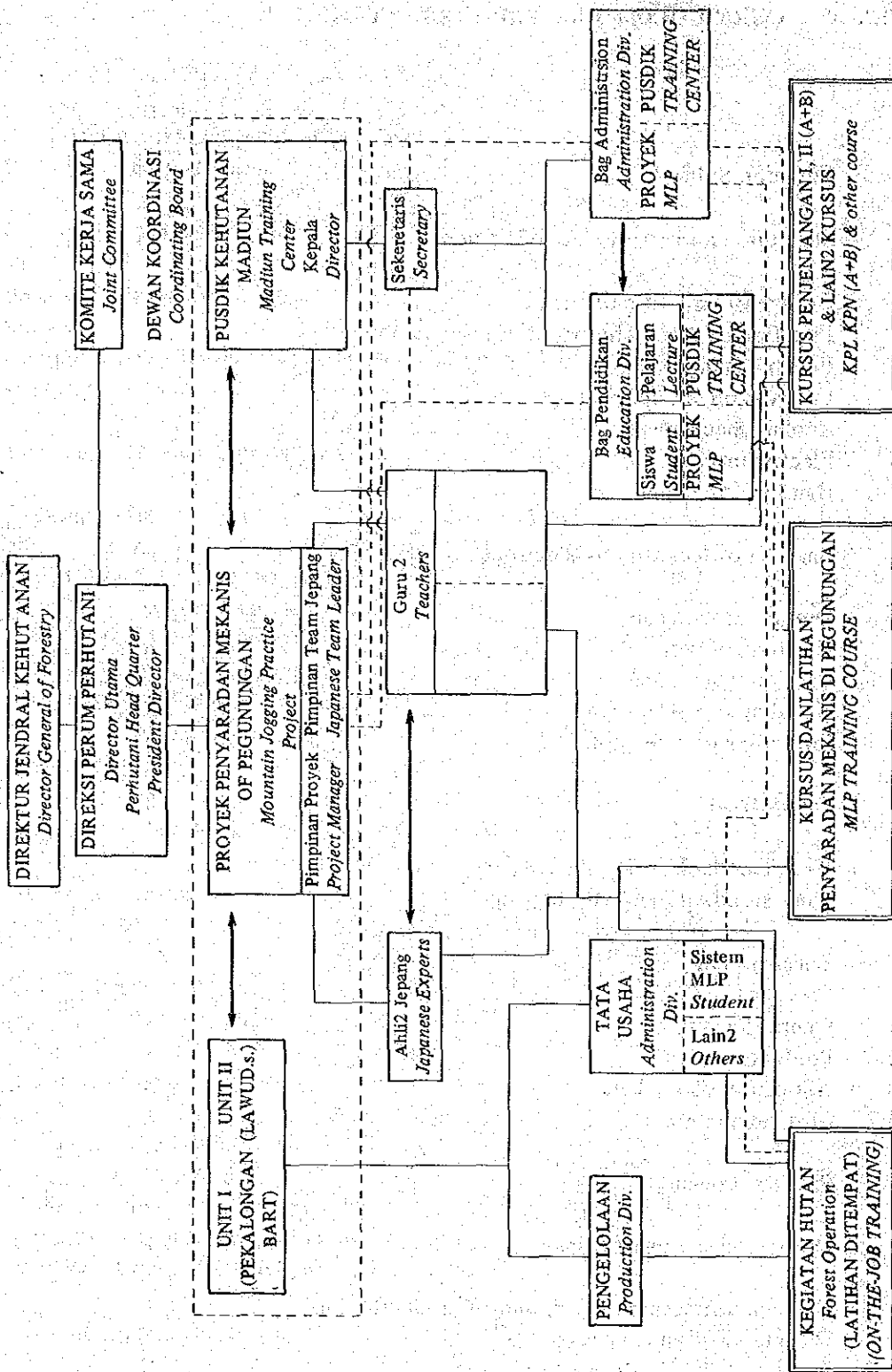
The Government of Indonesia has decided to build a pulp and paper mill in Central Java with a capacity of 200 ton newsprint per day. It is envisaged that only the pine (*Pinus merkusii*) in Pekalongan and Banyumas area is to be used as raw material for the pulp and paper plant.

Perum PERHUTANI will be responsible for the supply of wood required and has reserved 100,000 ha pine forest in the above mentioned area.

Technical assistance is required to make a comprehensive survey, i.e. on aerial and teristical survey and to suggest a suitable logging method to be applied.

G.E.A. : Dept. of Agriculture,
Dit. Cen. of Forestry

Annex IV Functional Organization Chart



ANNEX V. CURRICULUM FOR THE FIRST STAGE

		lecture	practice
1.	Common Subject		
1.1	Structure and Performance of Engine	(1)	(2)
1.1.1	Outline of structure of engine	X	X
1.1.2	Function of each component of engine body		X
1.1.3	Fuel mechanism		X
1.1.4	Lubrication and lubricant		X
1.1.5	Cooling mechanism		X
1.1.6	Electric mechanism		X
1.1.7	Handling of engine		X
1.2	Basic Knowledge about Wire-rope	(1½)	(6)
1.2.1	Outline of wire rope	X	X
1.2.2	Handling of wire rope	X	X
1.2.3	Caution when used		X
1.2.4	Handling of nylon rope	X	X
1.2.5	Processing of wire rope	X	X
1.3	Safety Work	(2)	(2)
1.3.1	Work standard of sky-line logging		X
1.3.2	Work standard of tractor logging	X	X
1.4	Logging Plan	(3)	(0)
1.4.1	Operation system	X	
1.4.2	Production plan	X	
1.4.3	Allocation of workers	X	
1.4.4	Cost calculation	X	
2.	Sky-line Logging		
2.1	Outline of Sky-line Logging	(1)	(1)
2.1.1	Name and function of each part of model sky-line		X
2.1.2	Outline of sky-line system	X	
2.1.3	Process of sky-line logging	X	
2.1.4	Process of sky-line setting	X	

		lecture	practice
2.2	Structure and Performance of Yarder and Accessories	(1)	(2)
2.2.1	Outline of yarder and accessories	X	X
2.2.2	Handling of accessories	X	X
2.3	Design of Sky-line System	(2)	(5)
2.3.1	Process of design	X	
2.3.2	Survey		X
2.3.3	Computation of tension of sky-line and operation line	X	X
2.3.4	Drawing	X	X
2.4	Practice of Sky-line Setting	(½)	(6½)
2.4.1	Sky-line setting	X	X
2.5	Driving Practice of Yarder	(0)	(10)
2.5.1	Daily and periodical check		X
2.5.2	Separate operation of driving device		X
2.5.3	Successive operation of driving device		X
3.	Tractor Logging		
3.1	Structure and Performance of Tractor	(1½)	(2½)
3.1.1	Structure of tractor		X
3.1.2	Performance of tractor	X	X
3.2	Driving Practice of Tractor	(0)	(6)
3.2.1	Driving		X
3.2.2	Tractor skidding operation		X
3.3	Process of Tractor Skidding	(2)	(0)
3.3.1	Characteristics of tractor skidding	X	
3.3.2	Construction of tractor-path and log yard	X	
3.3.3	Method of tractor skidding operation	X	
4.	Assembly/disassembly	(0)	
4.1	Yarder	(0)	X (4)

		lecture	practice
4.2	Tractor	(0)	X (7)
	(Total training day)	(15½)	(54)

() indicates member of training-day.

ANNEX VI. CHRONOLOGICAL TABLE

78	Apr.	20	Takikawa and Handa arrive at Jakarta (start of the project).
	May	7	Designing Mission headed by Shimoyama arrive at Jakarta (- Jun. 15).
		20	Naka arrive at Jakarta.
	Jul.	25	Shimoyama, Oyamada and Ueno arrive at Jakarta.
	Aug.	24	Kokura arrive at Jakarta.
	Sep.	2	Signing of practice yard construction contract.
		6	Signing of access road construction contract.
	Oct.	20	Kotari (Special Assistant to JICA President) visit MLP (Center and DF).
	Nov.	25	Equipments arrive at Center.
		27	The first training course start.
	Dec.	8	Sasaki arrive at Jakarta.
		15	The first Joint Committee is held at Jakarta.
79	Jan.	24	MLP Opening Ceremony is held at PUSDIK Madiun.
	Feb.	23	Pressmen's tour organized by Embassy of Japan visit MLP (Center).
	Mar.	26	The second stage of the first training course start.
	May	11	Hisamune (JICA Vice President) visit MLP (Center and DF).
	Jun.	8	Local Government officials visit MLP (DF).
	Jul.	2	The third stage of the first training course start.
		21	MLOF Opening Ceremony is held at MLOF.
	Sep.	3	JICA technical guidance mission headed by Shimokawa visit MLP (MLOF, Center and DF) (- 9 Sep.)
	Nov.	8	Equipments arrive at Center (vehicles).
		10	Equipments arrive at MLOF (four yarders).
		12	Machinery maintenance mission headed by Kawai visit MLP (MLOF and Center) (- 25 Nov.)
		27	Equipments arrive at Center (non-vehicles).
		27	Logging Project Norm Mission headed by Kamiizaka visit MLP (MLOF and Center) (- 7 Dec.)
	Dec.	3	The second training course start.
		21	The second Joint Committee is held at Jakarta.
80	Jan.		The fourth stage of the first training course start.
		29	Goda arrive at Jakarta.
	Mar.	10	Ohshima arrive at Jakarta.
		17	The second stage of the second training course start.

ANNEX VII. ABBREVIATIONS

PERHUTANI	=	State Forest Corporation (PERUM PERHUTANI)
MLP	=	Mountain Logging Practice Project in Java, ATA--184
DF	=	Demonstration Forest
MLOF	=	Model Logging Operation Forest
KPH	=	District Forest Office (Kesatuan Pemangkuan Hutan)
BKPH	=	Ranger's Office
Unit I	=	Central Java Regional Forest Office (located at Semarang)
Unit II	=	East Java Regional Forest Office (located at Surabaya)
PUSDIK	=	Training Institute (Pusat Pundidikan)
R/D	=	Record of Discussion
F/Y	=	Fiscal Year (April in the said year to March in the following year; in both Indonesia and Japan)
MI	=	Model Infrastructure Scheme

ANNEX VIII. COVERAGE OF LOCAL NEWSPAPER

The training covers lectures on basic theory and elementary practice at the Madiun training centre, and the demonstration forest at Lawu and practical training at the model logging forest at Pekalongan, Central Java. In principle, practical training in the model logging forest is implemented under the supervision of Perhutani in cooperation with Japanese experts.

Sky-line logging technology covers not only yarder and its accessories but also sky-line setting which needs special knowledge and technique covering from planning and construction to operation and maintenance. In order to master such technology within not more than a few years, lectures on theory are limited to as few as possible with field training as much as possible.

Training in Japan is aimed at providing trainees with more sophisticated and modern knowledge as well as at contributing to mutual understanding between the two countries.

Three technicians were sent to Japan for three months before the commencement of the project and they are now engaged in the project as instructors. Beside them, two technicians and one senior official were sent to Japan in 1978.

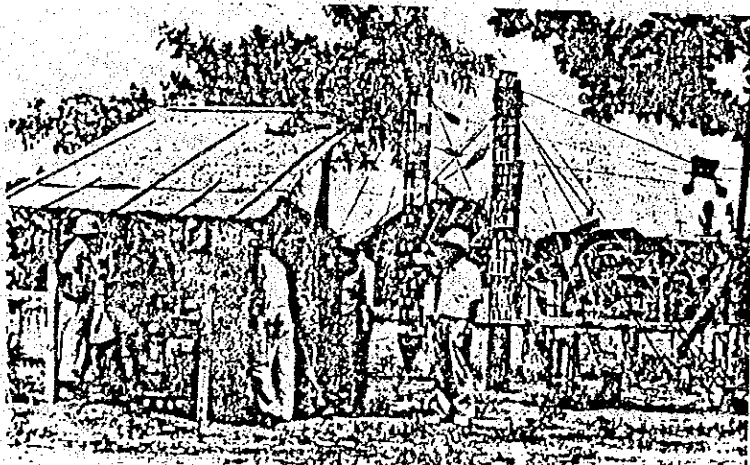
A total of 12 students joined the first training and participation in the next trainings will be enlarged, i.e. 24 students in the second and 32 students in the third training. According to the agreement, the Japanese government will increase grants in conformity with the number of students.

The Pekalongan forest district was chosen as an operation centre for the sky-line logging system in connection with the development of a paper mill in that region, which will need 500 m³ of pinus log a day, to be supplied by the West Pekalongan forest district and surroundings.



Mountain logging practice in Central Java.

Sky-line model for simulator at Madiun training centre.



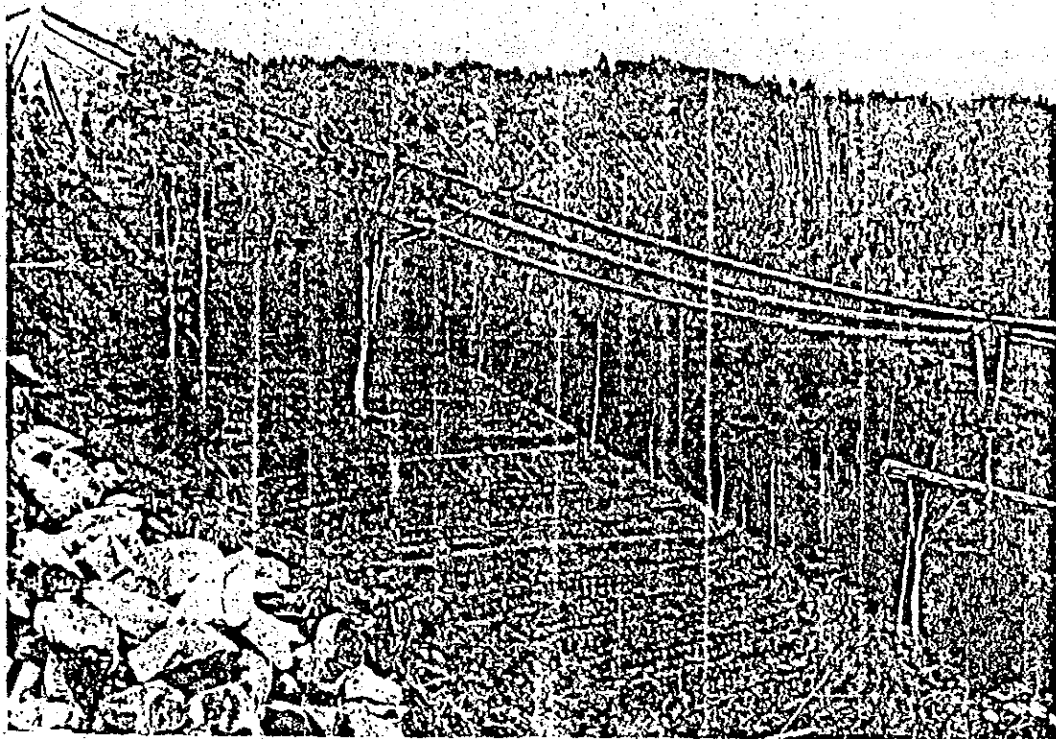


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MOUNTAIN LOGGING PRACTICE PROJECT IN EAST JAVA



Logging sky-line at the demonstration forest.

Forests in Java which are administered by "Perum Perhutani" Company are classified mainly into three types i.e. teak production forests, other production forests and protected forests. Teak is planted on gentle slopes or flat lands with an altitude lower than 700 meters. By contrast, *Pinus merkusii* is planted in mountainous areas with an altitude of from 700 — 1,000 meters.

Pinus Merkusii is planted for gum rosin production. It is one of Perhutani's local development programmes to introduce pine plantations and rosin production in mountainous areas where agricultural lands reach to hill tops.

Most man-made pine forests are

more than 40 years old, with reduced annual increment and rosin production, so that it is necessary to cut them down for replanting. Moreover, the Government has instructed Perhutani to supply pine logs to pulp and paper mills.

Pine forests are found in mountainous areas with slopes steeper than 25°, scattered in between farmland areas. Therefore, the sky-line logging technique is considered compatible with soil conservation of nearby agricultural lands as well as the forest lands themselves.

In mountainous regions where the topography is very slopy, hauling is a dangerous work and that is why Indonesia needs to study the techniques to the sky-line system, in this

case from Japanese experts.

An agreement between the Indonesian and Japanese governments says that the Japanese side will provide the machines, equipment and experts needed while the Indonesian side is responsible for trainees and training facilities. On January 24, 1979, the Director General of Forestry officially opened a Mountain Logging Practice Project at Madiun, East Java. Development of and training in mountain logging technology is the main purpose of the project. JICA's (Japan International Cooperation Agency) technical assistance to the project covers three aspects i.e. training Japan, the assignment of experts and the supply of heavy equipment.



DUA ORANG siswa MLP, tampak sedang menjalankan mesin "yarder" untuk menindahkan bakok kayu dari tempat yang satu ke tempat yang lain. Mereka mendemonstrasikan cara kerja pengangkutan kayu dengan menggunakan sistem "sky line" dengan peralatan mlml yg terdapat di Pusdik Kehutanan di Medun, Jawa Timur. (Foto: Buana/Dhars).

25% hingga 30%, serta tersebar di antara tanah pertanian dan perkebunan, maka penggunaan teknologi skyline logging ini sangat besar manfaatnya.

Mulanya, dari hutan pinus yang tumbuh di daerah pegunungan dengan ketinggian sekitar 700 s/d 1000 meter di atas permukaan laut, hanya diambil getahnya untuk dijadikan bahan terpentin. Karena sebagian besar pohon pinus itu telah berumur 40 tahun sehingga produksi getahnya setiap tahunnya telah menurun, maka perlu dengan segera dremajakan. Dan setelah pohon pinus yang tua diganti dengan yang lebih muda, maka pohon pinus tua tersebut akan digunakan sebagai bahan pembuat kerles. Terutama di gunung Slamet yang dalam waktu dekat

akan didirikan sebuah pabrik kerles di dekatnya, yaitu di daerah Notog, Banyumas, yg diperkirakan akan membutuhkan bahan baku berupa kayu pinus sebesar 500 m³ setiap harinya.

Cara kerja penyaradan di udara

Cara kerja penyaradan di udara dengan menggunakan sistem "sky line" ini menurut Ir. Bambang, salah seorang instruktur yang telah mengikuti "job training" khusus untuk ini di negara "Sakura", Jepang, di bawah kabel bentang yang panjangnya dapat mencapai jarak 1000 meter digantungkan ke rota peluncur yang disebut dengan istilah teknik "carriage". Kereta ini dapat digerakkan maju mundur dgn menggunakan kabel, kedua dan ketiga yang lebih kecil garis tengahnya daripada kabel bentangnya. Dan untuk menggerakkan kereta itu digunakan mesin statoner yg dinamakan "yarder", yg di samping itu digunakan pula untuk mengontrol kayu yang terdapat di jurang di bawah kabel untuk kemudian di bawa ke tempat penggergajian sebelum diangkut ke pabrik untuk diolah.

Menurut pengalaman para rimbawan Jepang yang juga menjadi instruktur di Pusat

datihan di Medun, prestasi satu unit sky line berkisar antara 25 m³ logs per hari, yg berarti antara 2500 s/d 3000 m³ logs per tahunnya.

Menurut R. Djumhadi, supply logs dengan menggunakan sistem penyaradan konvensional (dengan tenaga hewan) hanya dapat memenuhi kebutuhan pasaran secara terbatas. Hal ini disebabkan kemampuan hewan itu yang terbatas dan relatif kecil, sehingga ukuran kayu yang diangkutnya pendek, di samping volume kayu yang kecil serta jarak penyaradan yang pendek pula.

Sebaliknya, dengan menggunakan sistem sky line ini dapat mensuplai pasaran secara kontinu dalam berbagai ukuran dan jumlah yang besar, sehingga penggunaan dari pada kayu bisa lebih bervariasi dan pemasaran kayu menjadi lebih lancar. Sehingga nilai dari hasil hutan bisa lebih ditingkatkan".

(Sudharto)

Sistim "Sky Line Logging" Akan Memasuki Era Pembaharuan Dalam Dunia Kehutanan di Indonesia

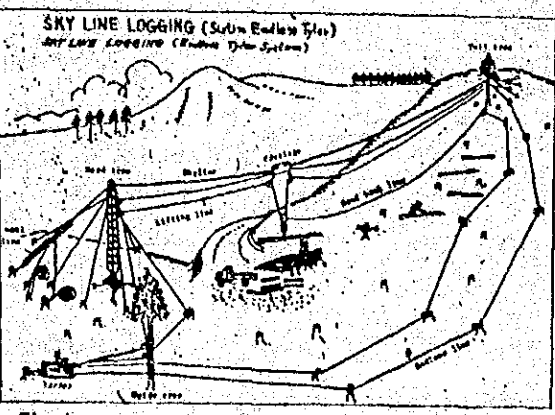
HUTAN dengan segala isi yang terkandung di dalamnya merupakan suatu kekayaan yang tak ternilai harganya. Bagi suatu negara yang memiliki hutan, hasil yang diperoleh dari hutan itu, seperti kayu, damar, getah, dsb... merupakan sumber devisa yang tak sedikit nilainya. Beberapa negara yang telah mengelola hasil hutannya secara besar-besaran seperti Kanada dan Finlandia, boleh dikatakan hampir setengah dari pendapatan negara itu diperoleh dari hasil hutan. Dan bagaimana dengan di Indonesia.

Indonesia, salah satu negara yang terletak di daerah tropis, sebenarnya termasuk negara yang memiliki potensi hasil hutan yang cukup besar. Tetapi karena sebagian besar dari hutan tersebut belum dibuka dan dikelola secara besar-besaran, maka hasil yang diperolehnya juga belum seberapa dibandingkan dengan apabila sudah dikelola secara maksimal. Tetapi walaupun demikian, hasilnya telah pula turut menentuskan devisa kita.

Dalam rangka mengelola hutan-hutan kini Indonesia sudah mulai memasuki tahap baru, yaitu penggunaan mekanisasi dalam penguasaan hutan di daerah pegunungan yang disebut dengan istilah "Mountain Logging Practice" (MLP).

Sebelum MLP ini diterapkan secara intensif di hutan Indonesia, maka pada tanggal 24 Januari 1979, Dirjen Kehutanan Soedjarmo, telah meresmikan sebuah proyek pendidikan di Madiun, dengan nama Proyek "Mountain Logging Practice".

Tujuan utama proyek ini adalah untuk mengembangkan dan melatih teknik penerapan secara mekanis di daerah pegunungan. Oleh karenanya, guna mencapai tujuan itu, maka Pemerintah RI dan Pemerintah Jepang telah mengadakan kerja sama, yang dalam pelaksanaannya dilakukan oleh Perum Perhutani dengan IICA. Dalam hal perjanjian tersebut antara lain ditunjukkan, bahwa pihak Jepang akan membetulkan tenaga-tenaga-pakar kehutanan Indonesia, baik di Jepang maupun di Indonesia (Madiun), serta menyediakan tenaga ahli dan peralatannya. Sedangkan pihak Indonesia berkewajiban menyediakan



Sketsa cara kerja sky line logging.

kan siswa, biaya pendidikan serta tempat latihan.

R. Djumhuri, selaku Pimpinan Proyek mengakui bahwa memang agak sulit menerjemahkan istilah itu, karena perkataan 'Loggi' mengandung arti rangkaian pekerjaan yang meliputi menebang, memotong dan menyalur. Walaupun demikian apabila kita mengimajinasikan terjemahannya yang tidak berakur pada pekerjaan pokoknya, maka menjadi 'Proyek Penerapan Mekanis di Pegunungan'.

Menggunakan istilah "skyline".

Bidang yang diarahkan dalam MLP adalah diikat beratkan pada pengangkutan kayu di daerah pegunungan dengan menggunakan sistem "skyline". Dalam sistem ini, dengan menggunakan kabel baja yang dibentangkan melintasi jurang dan lembah yang terdapat di daerah pegunungan maka kayu yang sudah dipotong dan bahkan pohon-pohon

yang sudah ditebang dapat diangkut melalui udara dari tempat yang tinggi ke tempat pemotongan, yang kemudian dengan menggunakan mobil diangkut ke pabrik untuk diolah.

Oleh R. Djumhuri dijelaskan, dengan menggunakan sistem ini dalam mengangkut kayu di daerah pegunungan, ada tiga keuntungan yang bisa didapat, yaitu:

1. Seluruh pohon dapat ditebang melalui udara, sehingga seluruh bagian pohon itu dapat dimanfaatkan

kan. Dengan demikian, produktivitas suatu area hutan dapat lebih ditingkatkan.

2. Karena pohon yang ditebang tidak menyentuh tanah, maka kerusakan tanah erosi serta kerusakan kerusakan lain yang dapat dihindarkan apabila diangkut melalui darat, misalnya menghancurkan pohon-pohon yang masih kecil dapat dihindarkan dan

3. Karena kabel bentang dapat disambung, sehingga dapat dicapai bagian-bagian hutan yang semula dianggap tidak produktif, karena tidak terjangkau.

Teknik skyline Logging di Jepang yang merupakan negara asal dari teknik ini, telah mengalami perkembangan yang sangat pesat, khususnya bagian besar hutannya terdapat di daerah pegunungan yang bertopografi curam.

Oleh R. Djumhuri dikatakan, bahwa sistem ini juga sesuai untuk usaha perlindungan tanah, baik di hutan lindung maupun di area perikanan yang terdapat di sekitar hutan.

Pohon pinus dan pabrik kertas

Dalam rangka memenuhi kebutuhan kertas di dalam negeri, Pemerintah merencanakan untuk membangun pabrik kertas yang memerlukan bahan baku berupa logs pinus, yang hal ini akan didukung oleh Perum Perhutani. Karena hutan pinus ini tumbuh di daerah pegunungan dengan kemiringan antara

ANNEX IX. LIST OF EXPERTS

Mr. Katsuhiko TAKIKAWA	Team Leader
Mr. Tsutomu HANDA	Logging Management
Mr. Hiroshi SHIMOYAMA	Logging
Mr. Koji OYAMADA	Sky-line Logging
Mr. Ichiro SASAKI	Forestry Machinery
Mr. Seiji UENO	Sky-line Logging
Mr. Ichio OHSHIMA	Sky-line Logging
Mr. Juro KOKURA	Tractor Logging
Mr. Terunori GODA	Forestry Machinery
Mr. Kenzo NAKA	Liaison Officer

As of March 1980

ANNEX X. LIST OF COUNTERPARTS AND OTHER OFFICIALS CONCERNED

MLP

Mr. Djoemhadi	Project Manager
Mr. Bambang Soebagio	Counterpart
Mr. Bambang Soeharjanto	Counterpart
Mr. Rachmadi	Counterpart
Mr. Marinus Ezerman	Counterpart
Mr. Djasmadi	Counterpart
Mr. Soedibjo	Counterpart
Mr. Kadarisman Alias Ardjawidjaya	Counterpart
Mr. Eddy Murjanto	Counterpart

Directorate General of Forestry

Mr. Soedjarwo	Director General of Forestry
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PERHUTANI Headquarter

Mr. Soekiman Atmosoedarjo	President Director
Mr. Hartono Wirjodarmodjo MA	Director, Production Bureau
Mr. Soeroso Siswodarsono	Director, Production Control Branch

PUSDIK Madiun

Mr. Moerdjono	Chief, PUSDIK Kehutanan Madiun
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PERHUTANI Unit I

Mr. R.I.S. Pramoedibjo	Regional Forester
Mr. Wahjudi	Deputy Regional Manager
Mr. Soelarso	District Forester, KPH Pekalongan Barat
Mr. Karjadi	Deputy District Forester, KPH Pekalongan Barat
Mr. Fao Atulo Waruwu	Ranger, BKPH Bumijawa

PERHUTANI Unit II

Mr. Syarief Moch Kemal	Deputy Regional Forester
Mr. Kamanaradi K.N.	District Forester, KPH Lawu
Mr. Dia Soenarjo	Ranger, BKPH wilis Barat

ANNEX XI. LIST OF TRAINEES

The First Trainees

1. Soebardjo
2. Hadi Siswoyo
3. Djoke Setiadi
4. Soewarto
5. Soenarjo
6. Bambang Ad
7. Rachmad
8. Soeparjo
9. Hendro
10. Rudy Suherman
11. Suhartono
12. Suparman

The Second Trainees

1. Djoko Soemanto
2. Untung Soebekti
3. Iwan Maulana
4. Soetjiadi
5. Kelik Poedjiharto
6. Soeroto
7. Yayat Hidayat
8. M. Sambik
9. Rasiman
10. Soemadi
11. Amat Suparmat
12. Milono
13. Didi Sapai
14. Toemirantoro
15. Soedjarwoto
16. Tanjono Soehardi
17. Moedjito
18. Soenarjo
19. Tatang
20. Siswojo
21. Soegeng Soetrisno
22. Djoemadi
23. Semedi Tohdjaja
24. Tilam

