

INTERIM REPORT ON
INDONESIA-JAPAN TECHNICAL COOPERATION FOR
MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA

AUGUST 1990

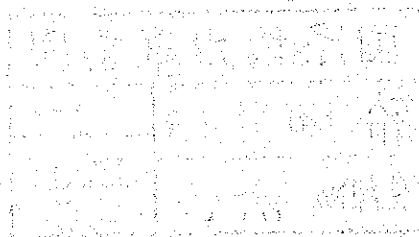
JAPAN INTERNATIONAL COOPERATION PROGRAM

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PREFACE

Six years have passed since Japan International Cooperation Agency (JICA) was established in 1974. During this period, Indonesia has been the largest counterpart country. This shows that Japan, the largest wood and wood products importer, has strong ties with Indonesia, the largest tropical wood and wood products exporter, not only in the field of trade but also in the field of cooperation.

In this circumstance I am sure that Indonesia-Japan technical cooperation project "Mountain Logging Practice Project in Java" will surely contribute to advance relationship between Indonesia and Japan as well as to develop mechanical logging technology in Indonesia.

Katsura Watanabe
Director,
Forestry & Fisheries Development
Cooperation Department,
JICA

FOREWORD

The first-dispatched experts arrived at Jakarta on 20 April 1978, when "Mountain Logging Practice Project in Java (=MLP)" started. The first training course started on 27 November 1978, the second one on 3 December 1979 and the first trainees are graduated in May, 1980.

Thanks to the heartfelt cooperation provided by PERUM PERHUTANI (State Forest Corporation), MLP has been enjoying smooth implementation and our JICA experts also have enjoyed comfortable life in Indonesia. In this occasion to issue the interim report, we would like to express our deep gratitude to the project manager and counterparts in Madiun, other PERHUTANI officers concerned in Jakarta, Semarang, Surabaya, Sulawi, Bumijawa, Madiun and Ngebel and also to JICA officers in Jakarta and Tokyo. MLP could not have been implemented so successfully if it did not receive their continuous cooperation.

We hope that MLP will further contribute to advance Indonesia-Japan cooperation in the field of forestry as well as to modernize logging work in Indonesia.

Tokyo, August 1980

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Hiroshi Shimoyama
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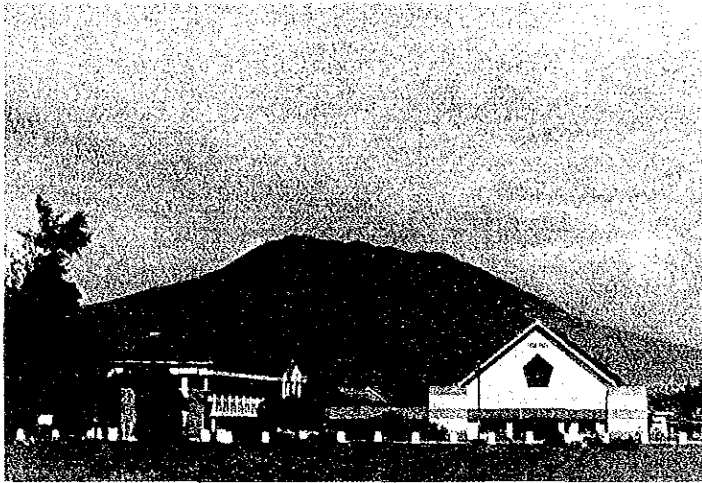


Photo 1. PERHUTANI's Forest Training Center with Mt. Lawu. (MLP's Project Center is placed in this Center.)



Photo 3. Opening Ceremony. List of equipments offered by JICA is handed over from Mr. Kumagai, Minister of Embassy of Japan to Dr. Soekiman, Director General of PERHUTANI.



Photo 2. Exhibition of MLP after the Opening Ceremony. Dr. Soedjarwo, Director General of Forestry and Mr. Kumagai, Minister of Embassy of Japan are seen in Center.



Photo 4. Equipments offered by JICA has arrived at MLP's Project Center.

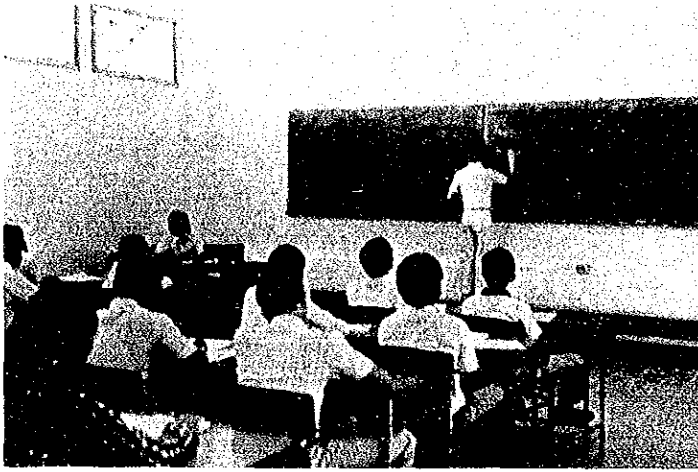


Photo 5. Lecture. Expert, counterpart and trainees.



Photo 6. Exercise of wiresplice.

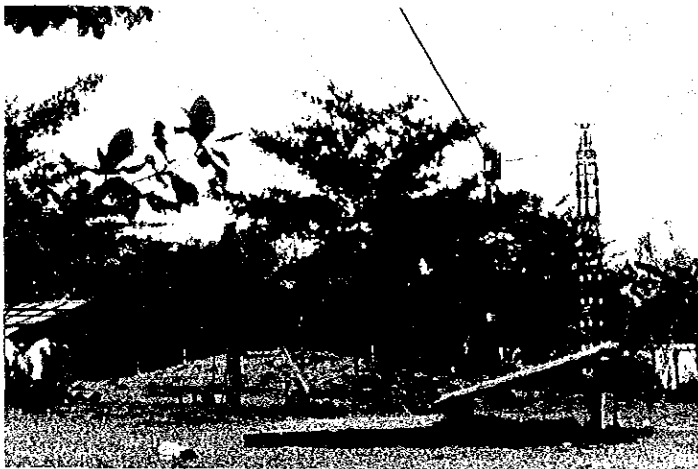


Photo 7. Exercise of sky-line logging simulator.



Photo 8. Tractor logging training.



Photo 9. Exercise of sky-line setting.

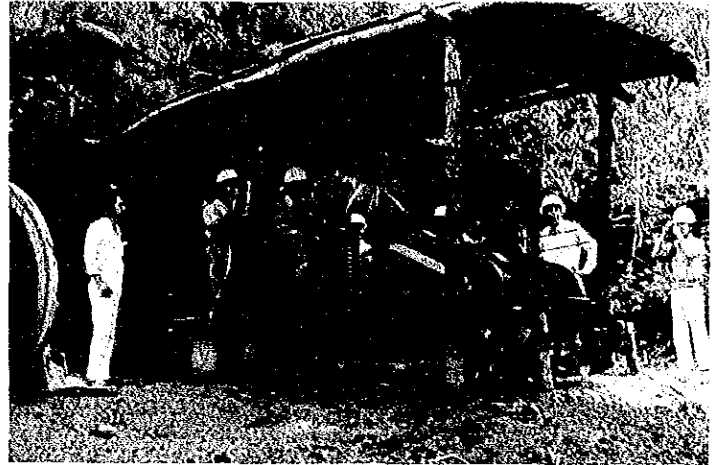


Photo 10. Exercise of yarder operation.



Photo 11. Access road construction of D.F. under JICA's model infrastructure scheme.

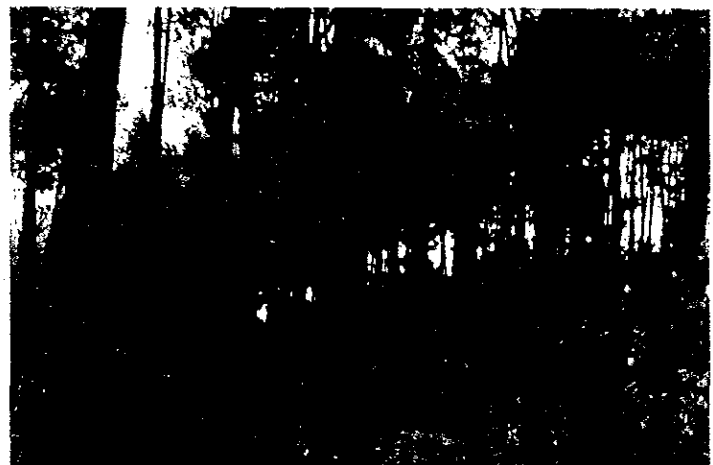
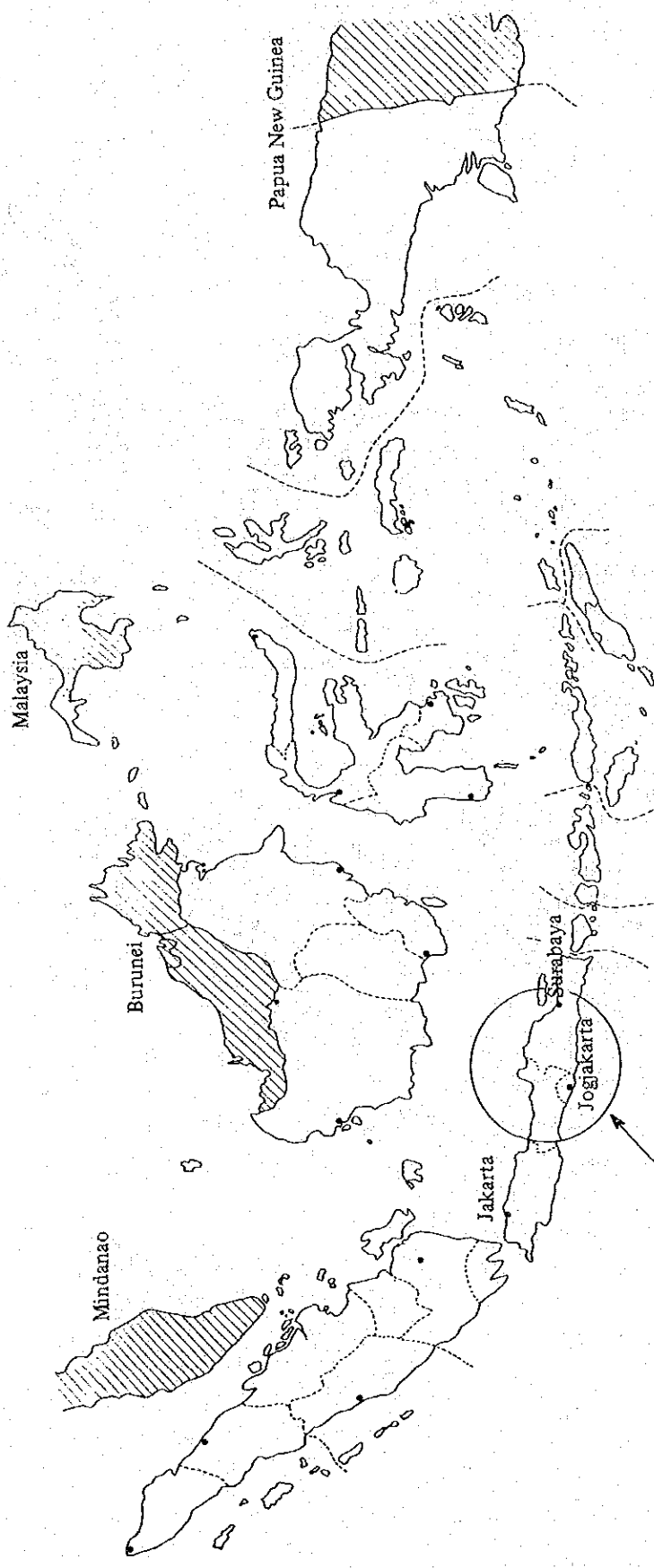
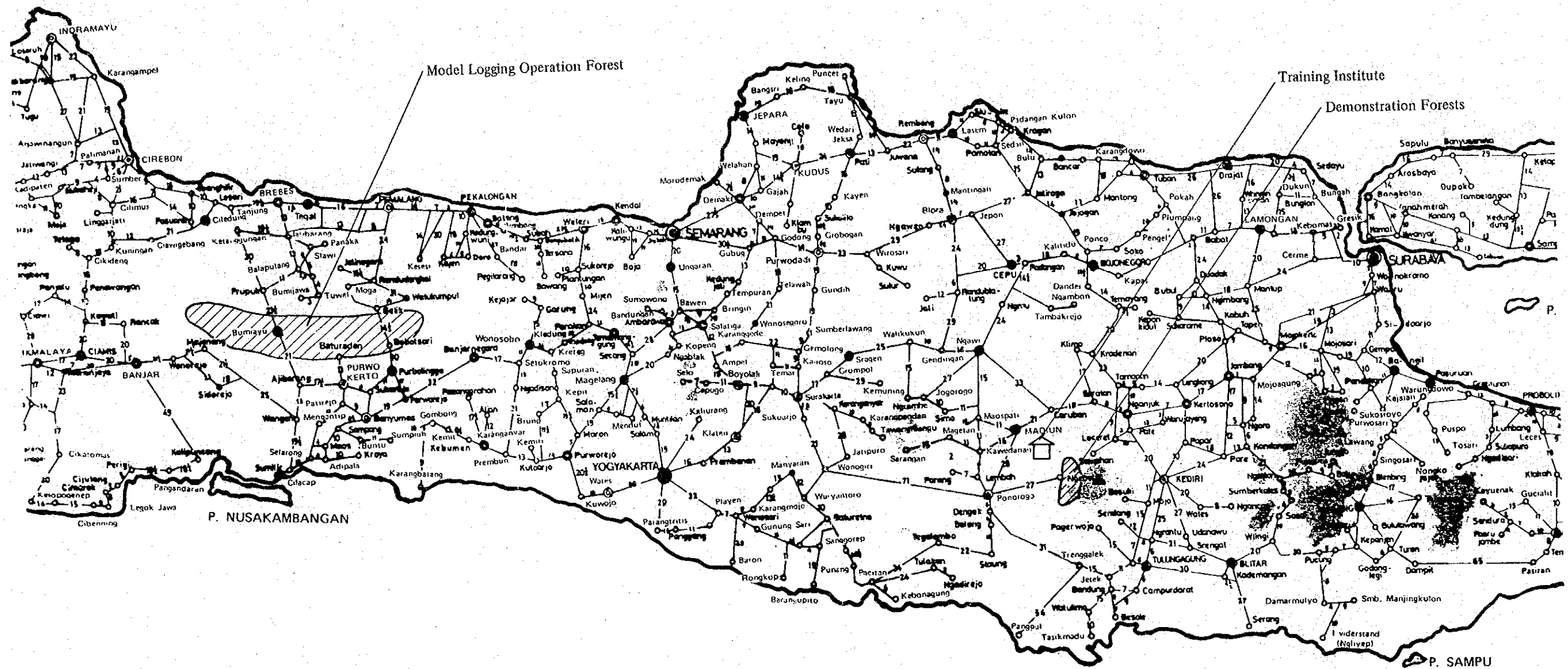


Photo 12. Merkusii pine plantation.



The Republic of Indonesia



Situation of "Mountain Logging Practice Project in Java"

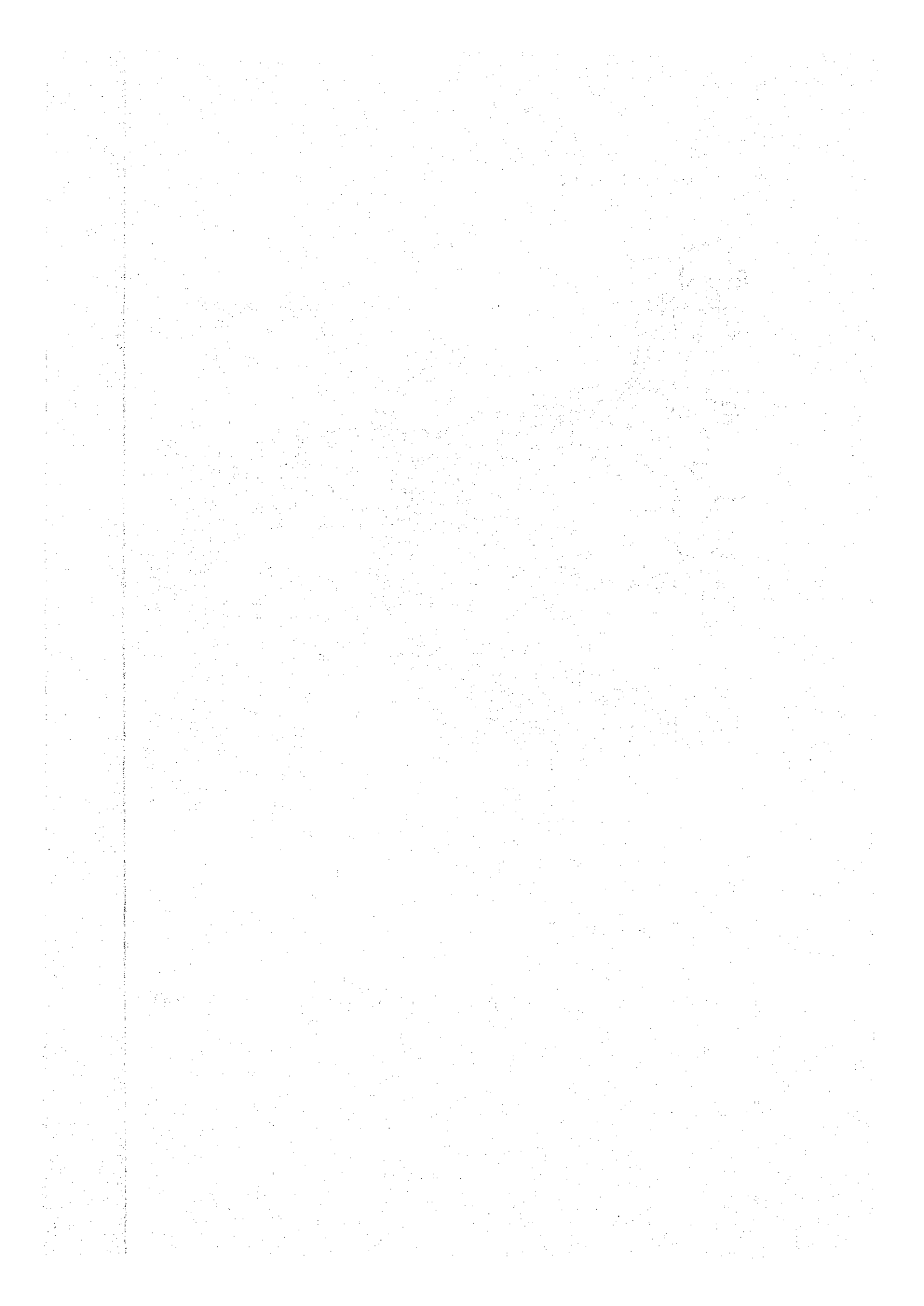


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1. INTRODUCTION

1.1 History and Background of The Project

All the forests in Java island are under the management of Perum PERHUTANI. Pine forests (*Pinus merkusii*) in Java have been developed with the major aim to produce rosin and with the minor aims to supply materials for match, fuel wood, electric pole, board and the like.

On the other hand Indonesia has long planned to establish a pulp and paper mill in Central Java, and the pine forests attracted attention because of their rich resources. Though these forests are harvested by manpower at present, when a pulp and paper mill is realized manpower logging can not cope with the demand of large and constant quantity.

The pine forests are distributed in steep hills more than 700 m above sea level and furthermore they are sporadically distributed and mingled with terraced upland farm fields. Therefore sky-line logging system, which is compatible with soil conservation, was highly requested.

In June 1975 JICA sent a project-finding mission on forestry to Indonesia. In March the following year, JICA's cooperation began in Central Java to survey forest resources there, in connection with the above said pulp and paper mill plant. Before the survey project completed in 1977, Indonesia proposed a "Mountain Logging Training Center" project as a following-up project (See the Annex I). This idea was also approved by BAPENAS (National Development Planning Agency, Republic of Indonesia) and BAPENAS's "List of Technical Assistance Proposal 1977/78" has included "ATA-184 Forest Inventory for Management and Logging Plan for Raw Material Supply to Central Java Pulp & Paper Mill" (See Annex III). In response to the proposal JICA sent a mission in July 1977 to study out a project's blue print, based upon which, R/D was signed in December 1977 by Mr. Soekiman and Mr. Mishina for "Mountain Logging Practice Project in Java" (See Annex II).

The project started on 20 April 1978 when the first-dispatched experts, Messrs. Takikawa and Handa arrived at Jakarta.

1.2 Outline of The Project

The main work of the project is the execution of a training course.

1.2.1 Training Programme

The training is aimed to transfer mountain logging technology, especially sky-line logging technology. Although sky-line logging technology is based upon a wide range of science, ex. geometry, algebra, dynamics, mechanical engineering, etc., MLP training course has excluded

these rather academic subjects and concentrated on "daily technology". In other words the main purpose of the MLP training course is to graduate technical leaders of mechanical logging who are able to operate the mechanical logging and to lead and supervise overall logging works.

It goes without saying that successful transfer of mechanical logging technology needs training of logging management, machinery maintenance, etc. This kinds of sophisticated training will be given in Japan to some excellent graduates under JICA's training-in-Japan scheme. Moreover expert team hopes that JICA will receive some excellent counterparts to study highly professional subjects in Japan, later who will contribute to further develop mechanical logging technology in Indonesia.

The training course lasts for 18 months and is divided into 4 stages:

Stage	Term (month)	Place	Content of Training
I	4	Center	Elementary practice and lecture
II	3	DF	Practical training
III	6	MLOF	On-the-job training with high-density instruction by experts
IV	5	MLOF	On-the-job training with low-density instruction by experts

1.2.2 Training Curriculum

As mentioned above, the fundamental object of the training course is to graduate mechanical logging operation leaders. In the light of this object, the curriculum has been composed so as to give fundamental knowledge and technique of, as for sky-line logging, design, setting/withdrawal and operation of yarder, and as for tractor logging, construction of tractor-path and log yard and tractor skidding operation.

As MLP does not intend to be an academical institute, lectures are limited as few as possible and practices are given as many as needed. Trainees will master the technique through hand-experience.

The trainees have not known anything about sky-line logging before joining the course, therefore trainees are to see and touch yarder, wire-rope, accessories etc. in order to form the image of sky-line logging at the beginning of the training course. After the formation of the image, lecture and practice is received easily.

(1) The First Stage

See Annex V.

(2) The Second Stage

The trainees practice measuring, designing, setting, yarding and withdrawal by two or three times, which they have experienced at the first stage by using simulator.

When it rains, trainees will receive supplementary lecture.

(3) The Third and Fourth Stage

So-called on-the-job training is carried out in these two stages. The trainees are expected to develop their logging operation from training operation upto commercially-based one.

Repetition is the best way to master the sky-line logging technology. As topographical condition and forest stand differ site by site, sky-line system must be adjusted at each logging site while the fundamental technique might be unchanged. Therefore, the more times the trainees practice, the more easily they can modify the sky-line system so as to fit to each logging site after graduation.

As for tractor logging, trainees will practice skidding and construction of tractor-path and log yard.

When deemed necessary, experts will give supplementary lessons on elementary theory and technique which many trainees seem not to have fully understood and on problems which have occurred frequently during the training.

The third stage is a stage in which trainees deepen their experience.

The fourth stage is a stage in which trainees are expected to become able to operate mechanical logging by themselves with some workers. In this stage some variation of sky-line system will be implemented.

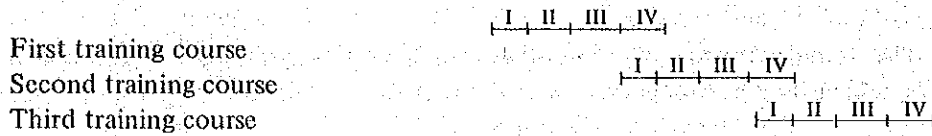
1.2.3 Trainees

MLP training course will graduate 60 trainees:

- the first training course; 12 trainees, from Nov. 1978 to May 1980
- the second training course; 24 trainees, from Dec. 1979 to May 1981
- the third training course; 24 trainees, from Dec. 1980 to May 1982

The graduates will work mainly as technical staff who will be the leader of logging operation in PERHUTANI's working sites. (Annex I of R/D)

1978 / 1979 / 1980 / 1981 / 1982



1.2.4 Project Sites and Facilities

MLP has three project sites:

(1) The Project Center

MLP has the Project Center in the PERHUTANI's Training Institute (=PUSDIK) at Madiun, 170 km from Surabaya.

(2) Demonstration Forest (=DF)

DF is located at Ngebel under the jurisdiction of Lawu Forest District (KPH Lawu), 45 km (1½-hour driving) from the Center.

(3) Model Logging Operation Forest (=MLOF)

MLOF is located at Bumijawa under the jurisdiction of Pekalongan Barat Forest District (KPH Pekalongan Barat), 420 km (9-hour Driving) from the Center.

The map of the project's location is seen at page 6.

MLP has been provided with following facilities:

List of Facilities

(1) Project Center

(i)	Team Leader/Project Manager Room	40 m ²
(ii)	Expert/Counterpart Room	63 m ²
(iii)	Secretary/Typewriter/Photocopy Room	28 m ²
(iv)	Class Room	110 m ²
(v)	Dormitory	
(vi)	Workshop	300 m ²
(vii)	Warehouse	110 m ² , 120 m ²
(viii)	Training Yard	3,000 m ²
	(Some part of the yard was prepared by JICA's MI scheme)	
(ix)	Garage	170 m ²
(x)	Oil House	24 m ²

(2) DF

(i)	Access Road (1 km out of 3½ km was prepared by JICA's MI scheme)	3½ km
(ii)	Rest House	50 m ²
(iii)	Warehouse	40 m ²
(iv)	Oil House	30 m ²
(v)	Advance Camp	Expert/Counterpart Trainees
		102 m ² 60 m ²

(3) MLOF

(i)	Access Road	6 km
(ii)	Rest House	115 m ²
(iii)	Warehouse/Garage	140 m ²
(iv)	Oil House	30 m ²
(v)	Advance Camp	Expert Counterpart Trainees
		150 m ² 90 m ² 130 m ²

1.2.5 JICA's "Project-type" Technical Cooperation Project

JICA executes its technical cooperation projects with three fundamental means:

- dispatch of experts
- offer of equipments
- training in Japan

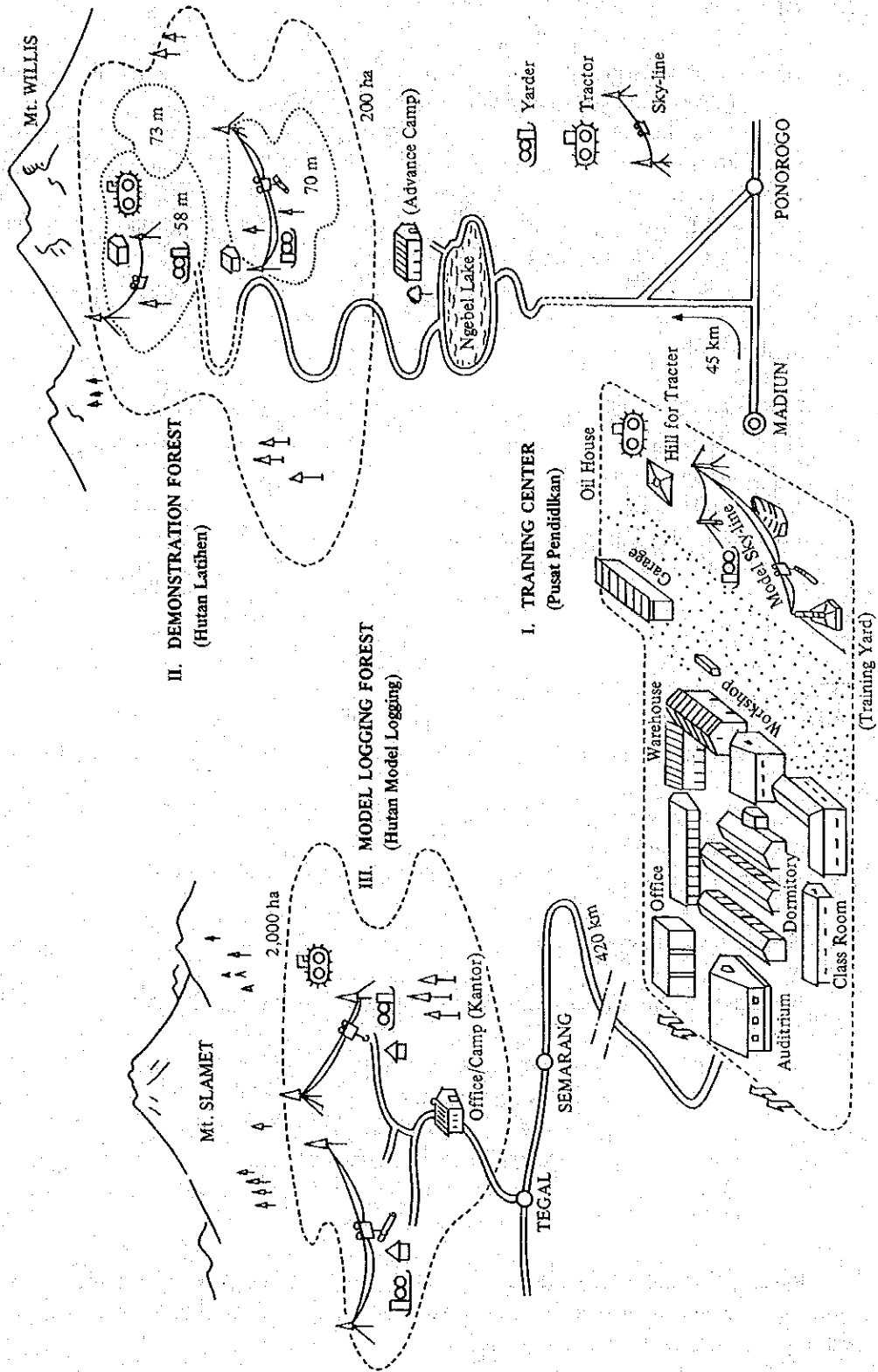
(1) Dispatch of Experts

Basic idea of the allocation of JICA experts to MLP is as follows:

One	team leader
Two	logging lecturers
Two - Three	sky-line logging technicians
One	tractor logging technician
One	machinery maintenance technician
One	liaison officer

Besides the above long-term (two years) experts, MLP will need some short-term experts time to time in the field of ex. machinery, cost analysis, wood utilization, soil conservation, wood physics, forestry civil engineering, etc.

SKETS DARI PADA PROYEK
 BIRD'S-EYE VIEW OF THE PROJECT



(2) Offer of Equipments

Mechanical logging needs a very wide range of equipments i.e. heavy equipments, vehicles, wire rope, accessories, tools, spareparts and the like. With a view to assure smooth and safe implementation of the training course, quantity and capacity of these equipments offered and to be offered are more than needed in ordinal commercial-oriented operation.

(3) Training in Japan

18-month training under MLP covers all the elementary technique necessary for mechanical logging operation. However more sophisticated technique necessary for commercial operation can not be covered during the MLP training course in Indonesia. Then JICA's training-in-Japan scheme is applied to candidates of counterparts, some of graduates of the training course and some PERHUTANI's senior officers in order to assure that the technology transfered by MLP develops in Indonesia by PERHUTANI's itself.

2. PERFORMANCE AND REVIEW OF THE FIRST TWO COOPERATION YEAR

2.1 The First Training Course

The first training course started on 27 November 1978 with the term of 18 months. The basic policy of the expert team is to transfer technology from hands to hands.

Since the trainees had not known anything about sky-line logging, the first step of the training was to implant the image of sky-line logging in their brains. Lecture and practice started after each trainees saw and touch yarder, wire-rope, block, shackle and other accessories by themselves. Moreover lecture and practice were systematically combined each other so as that lecture helped trainees understand practice and practice helped trainees understand lecture.

Although sky-line logging is safe as long as operated properly, it might lead serious accident if improperly operated. While the training has so far been carried out without any serious accidents, MLP will pay more attention to safety than ever in order to complete the project safely.

2.1.1 The First Stage

The first stage started on 27 November 1978. The list of the trainees is seen in Annex XI.

The trainees studied elementary technique and theory of sky-line logging and tractor logging as follows:

- (1) Sky-line Logging
 - (a) sky-line logging system
 - (b) structure of yarder and its accessories
 - (c) designing of sky-line and the way to set it
 - (d) yarder operation
 - (e) assembly/disassembly of yarder
- (2) Tractor Logging
 - (a) tractor logging system
 - (b) structure of tractor
 - (c) tractor operation
 - (d) assembly/disassembly of tractor

(3) Common Subject

- (a) structure and performance of engine
- (b) wire-rope
- (c) safety work

See Annex V for precise curriculum.

At the end of the stage the trainees received examination about operation of yarder/ tractor and fundamental knowledge of mechanical logging. The examination did not have a passing mark, rather, of which result helped experts improve their instruction method in the following stages.

2.1.2 The Second Stage

The second stage started on 26 March 1979 at DF after one-week vacation and lasted for three months.

The main aim of this stage was to apply the knowledge and technique gained in the first stage to actual logging operation in forest.

The trainees studied:

- (a) survey and design,
- (b) setting/withdrawal,
- (c) yarder operation and yarding work and
- (d) safety work,

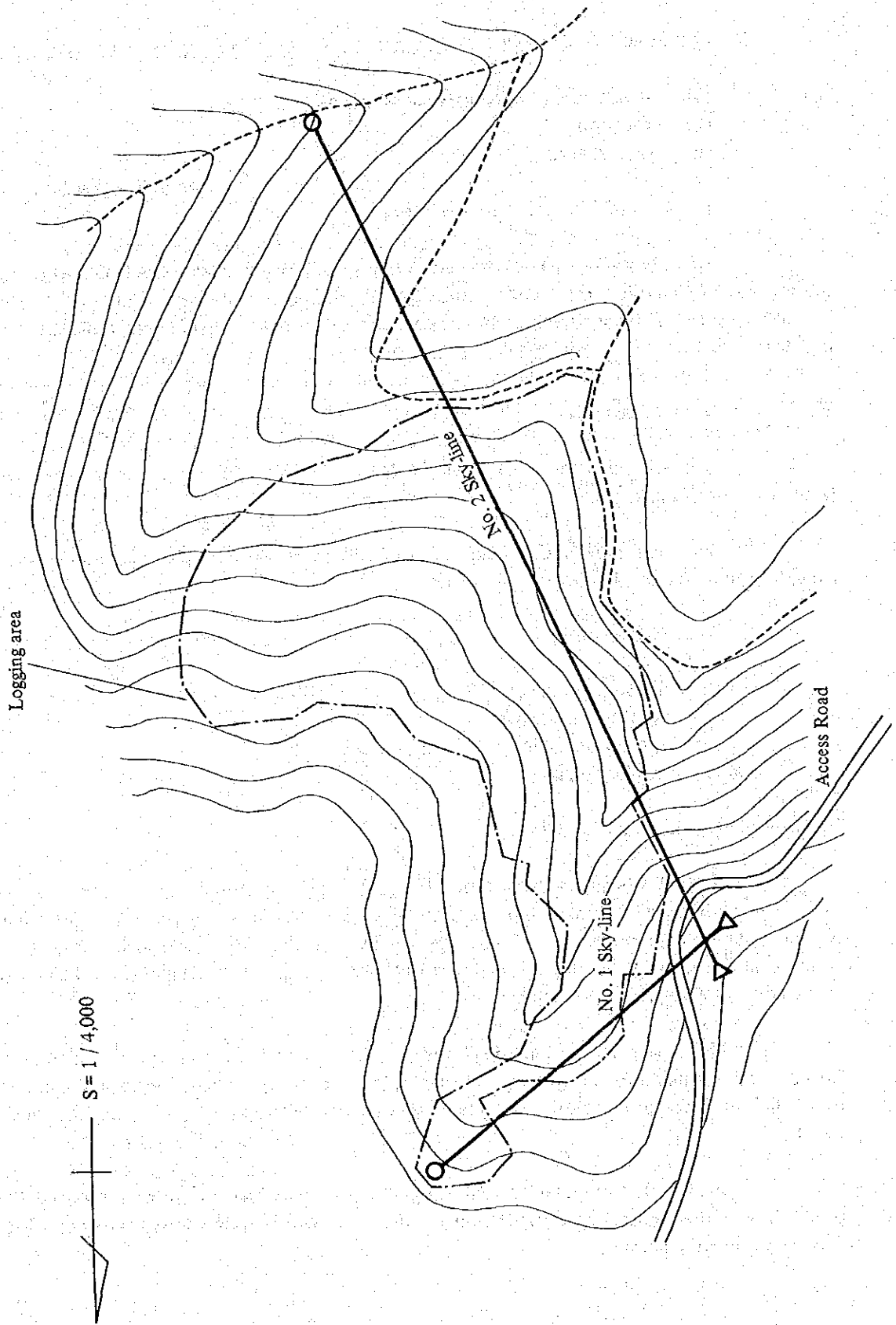
by two times of sky-line installation.

Setting work was carried out by a full-member group in order that each trainees experienced all the works related to setting. Sky-line was designed by individual trainees as a practice. The remaining works were carried out by a small-member group in rotation (ex. group A for loading, group B for unloading and group C for yarder operation), which helped trainees study coordination with other group.

No. 1 sky-line was worked out under the leadership of experts. However No. 2 sky-line was entrusted to counterparts and trainees. For example trainees designed No. 2 sky-line under the guidance of counterparts then they consulted with experts, after that the design was fixed.

And as for preparation and programme of daily work, trainees planned them by themselves, which experts gave suggestion to. In other words trainees were leading actors while experts supporting actors.

THE MAP OF TRAINING SITE (DF)



DF is 45 km and 1½-hour driving from the Center. In order to save time, experts, counterparts and trainees lodged in an advance camp located by the lake Ngebel. This lodging system was effective not only for time-saving but also for providing frank and light-hearted question-and-answer as well as for deepening human relationship.

Specification and the results of No. 1 and No. 2 sky-line is as follows:

System of sky-line	No. 1 endless-tyler	No. 2 endless-tyler
Span (m)	237	670
Gradient (degree)	-2	+3
Logging area (ha)	0.6	1.2
Log harvested (m ³)	135	125
Setting work (week)	3	2
Yarding work (week)	3	2
Withdrawal work (week)	0.5	0.5

The main aim of the second stage is not to produce logs but to practice sky-line logging operation. In this context trainees' experience should be considered as the main product while log as sub product.

2.1.3 The Third and Fourth Stage

On-the-job training at MLOF started on 2 July 1979 with the term of 11 months. MLOF is 420 km and 9-hour driving from the Center. Experts and counterparts were dispatched from the Center to MLOF with the term of 10-14 days in rotation while two counterparts and all the trainees were permanently stationed in an advance camp at Bumijawa village near MLOF.

The main aim of these two stage is to bridge training with job. The trainees have already experienced actual mechanical logging work at DF in the second stage. And the trainees when graduated must, by themselves, operate mechanical logging as their own job. Therefore they are requested not to stay in pure-training logging operation but to step upto semi-commercial logging operation by deepening experience to participate PERHUTANI's logging activities at KPH Pekalongan Barat.

When necessary some supplementary lessons were given to solve problems which arose during the training and to remind trainees of some important technique, as it was in the second stage, which included:

- (a) insufficient understanding about miscellaneous but fundamental items, ex.
 - the way to install guy-lines
 - the way to attach clips
 - ceasing of wire-rope
 - splice of nylon rope
 - theory of heel-block

- (b) insufficient understanding about designing and drawing
- (c) unconcern to arrangement of works
- (d) unskillful to eye-measurement of log volume
- (e) imperfect daily check

Those which were understood insufficiently or forgotten were rather easier to cope with, more serious were those which trainees omitted or neglected owing to their laziness though fully understood. These matters are easy to lead serious accident therefore experts gave strict instruction on these matters, and when some troubles occurred safety-study meeting was held on all occasions, where the trainees analyzed the cause of the troubles and studied the measure preventing them by themselves. This meeting is considered to help to raise the trainees' conscienceness for safety work and to prevent accident.

(1) The third stage was carried out for 6 months with high-density instruction by experts. It was preferable and effective to practice sky-line logging with small-scale group, however many, though not majority, of trainees still remained unskilled. Therefore sky-line No. 1, No. 2 and No. 3 were carried out with full-member group, i.e. all the twelve trainees practiced first three sky-line installment in one group, while yarding work was implemented with a four-man group.

After full-member group practiced three times of sky-line logging work, the twelve trainees were divided into three four-man groups. One of the four trainees of each group was nominated as a group leader. He was responsible for all the programme and implementation of – survey, design, setting, yarding, withdrawal, etc. – of the sky-line which his group executed from first to last. A leader was changed when the group moved to another logging site. This result is considered to be helpful for the trainees to master self-support manner in the fourth stage. Since designing is important and difficult work among others, each trainee was given home work of design, which was checked by counterparts and experts later.

As for tractor logging, trainees practiced skidding, and construction of log yard and tractor path after retraining of tractor operation.

(2) The main aim of the fourth stage is to brush-up technique so far mastered so as that trainees can stand on their own feet when graduated. In this circumstance experts instruction is limited to only key points ex. setting and withdrawal.

Sky-line logging can be effective and economical only when it is modified so as to fit to each logging site's topographical condition and forest stand. In this context trainees will practice falling-block system and double-endless sytem besides endless-tyler system at the end of the stage.

As for tractor logging, with the aim of brushing-up, trainees will practice forest civil engineering work.

Assembly/disassembly was already practiced briefly in the first stage. As the graduation is near in hand and trainees have been experienced in machinery, MLP provided intensive

course on machinery in this stage since March until April for about one month with the help by a short-term expert on machinery. The progress of the third and fourth stage, as of end of March 1980, is as follows:

Sky-line Logging:

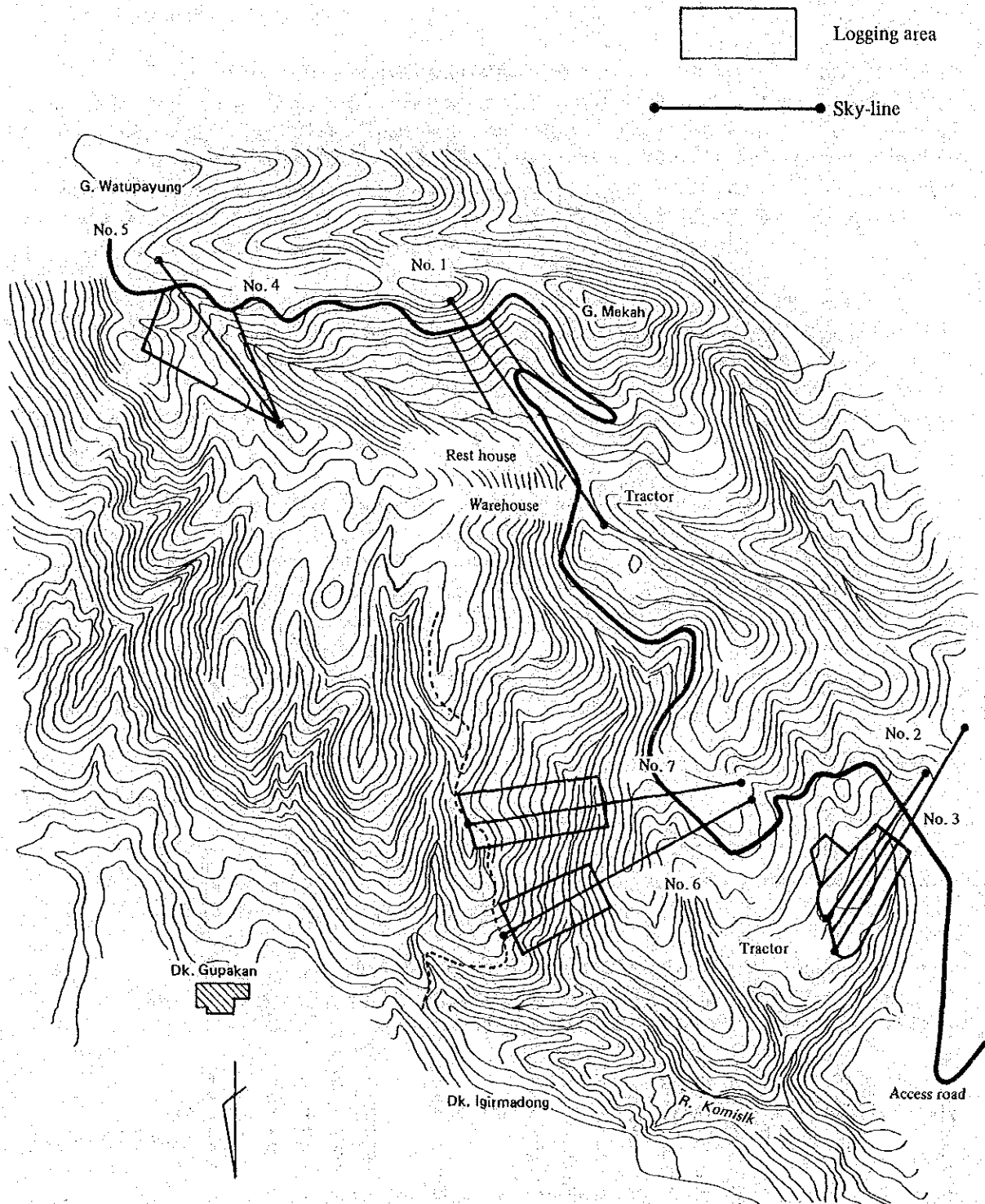
Sky-line system	No. 1		No. 2		No. 3		No. 4		No. 5		No. 6		No. 7	
	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	endless-tyler	falling-block	falling-block
Span (m)	530	430	620	660	430	560	510							
Gradient (degree)	+11	+5	+6	+9	+6	-5	+9							+9
Yarding (day)	19	18	45	64	45	10								
Yarding (hour)	82	85	219	290	191	33								
Log harvested (m ³)	116	132	489	687	526	83								
Productivity (m ³ /day)	6.1	7.3	10.9	10.7	11.7	8.3								
Productivity (m ³ /hour)	1.4	1.6	2.2	2.4	2.8	2.5								
Net productivity (m ³ /6 hours)	8.4	9.6	13.2	14.4	16.8	15.0								

Tractor Logging:

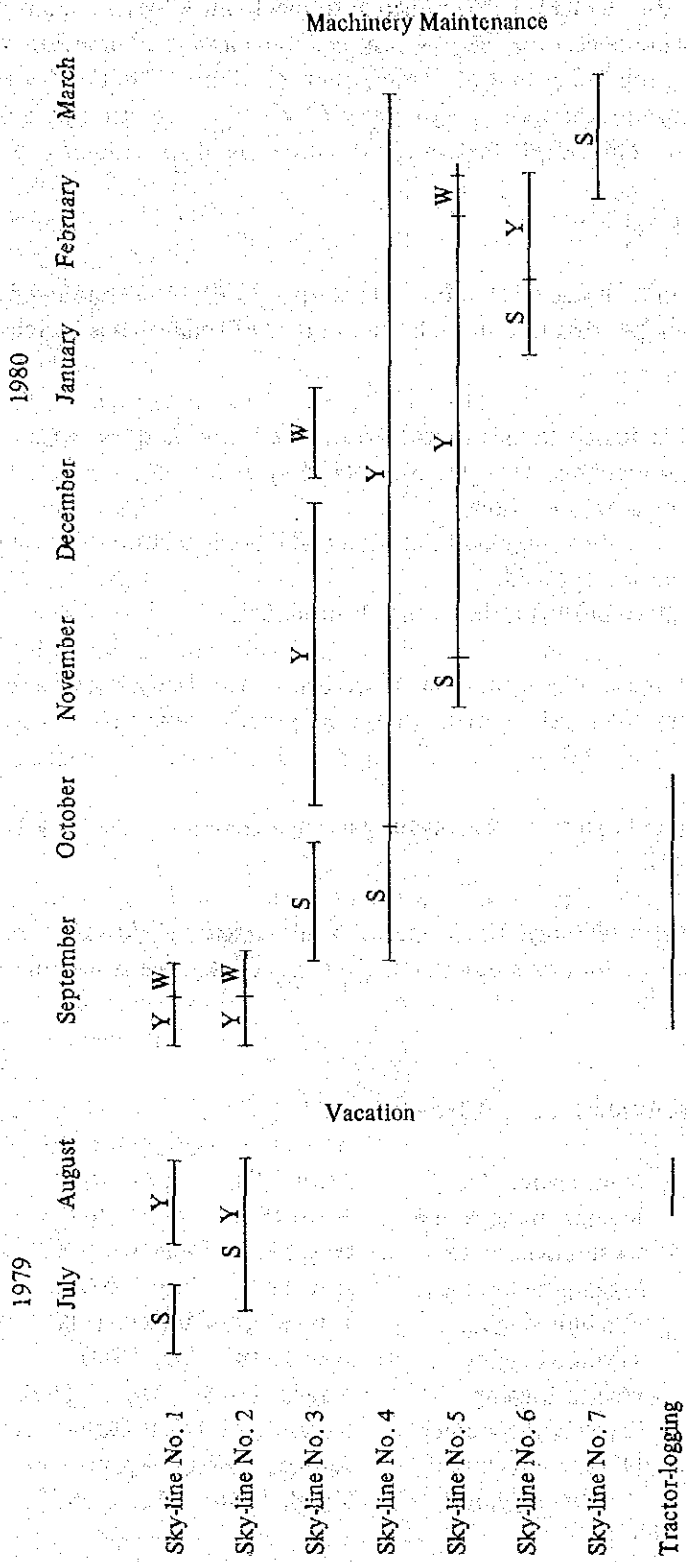
Skidding (day)	19
Skidding (hour)	96
Log harvested (m ³)	240
Productivity (m ³ /day)	12.6
Productivity (m ³ /hour)	2.5
Net productivity (m ³ /6 hours)	15.0

(July 1979 - March 1980)

THE MAP OF TRAINING SITE (MLOF)



ON-THE-JOB TRAINING AT MLOF



S: Setting
 Y: Yarding
 W: Withdraw

MLP training course is no more than training, even though "on-the-job" in the third and fourth stage. Moreover, due to KPH's inexperience to mechanical logging management, felling work and log transport were sometimes slower tempo than logging. Therefore working day and working hour were not in the full extent of yarder/tractor's ability. That's why the productivity is rather low, however the productivity has increased by nearly two times when compared between No. 1, 2 and No. 5, 6. This simple fact shows the progress of the trainees.

2.2 The Second Training Course

The second training course started on 3 December 1979. The training is more effective in the second course than the first one though the number of trainees has increased from 12 to 24. Because,

- (a) Trainees were able to see the simulator on the first day of the course. This helped the new trainees understand what was sky-line & system.
- (b) Experts have made a progress in language.
- (c) Counterparts have made a progress in mechanical logging technology.
- (d) Textbooks have been improved.
- (e) Some textbooks have been translated into Indonesian.

Of course the increase of the number of trainees was a fairly big problem. Experts have coped with this problem by making small groups at practice hours so as that lookers-on would not appear.

The training subjects were almost same as that of the first training course, while some of them have been revised.

After four-month first stage including 2-week assembling/disassembling course, trainees have moved to DF, where they will practice three times of sky-line installment.

2.3 Dispatch of Experts

JICA has sent (as of March 1980) 10 experts.

K. Takikawa	team leader	April 1978 – April 1980
T. Handa	logging management	April 1978 – April 1980
K. Naka	liaison officer	May 1978 – May 1980
H. Shimoyama	logging technology	July 1978 – July 1980
K. Oyamada	sky-line logging	July 1978 – August 1980
S. Ueno	sky-line logging	July 1978 – July 1980
J. Kokura	tractor logging	August 1978 – August 1980
I. Sasaki	forestry machinery	December 1978 – December 1980
T. Goda	forestry machinery	January 1980 – April 1980
I. Ohshima	sky-line logging	March 1980 – March 1982

2.4 Offer of Equipments

JICA has sent following various kind of equipments:

Item	Quantity	
	F/Y 1978	F/Y 1979
Yarder (large)	3	6
Yarder (small)	1	
Tractor (crawler)	1	1
(wheel)		1
Truck		1
Truck with crane	1	
All terrain car	1	1
Station wagon	1	
Micro bus	2	2
Wire rope		
Accessories		
Tools		
Education equipments		
Stationeries		
Total amount (million yen c.i.f.)	83	90

All these equipments are being fully utilized for the implementation of MLP.

In the light of experience in the last two years, while PERHUTANI is requested to promptly proceed custom clearance, JICA is requested to send equipments with less number of shipping.

2.5 Training in Japan

JICA has received following PERHUTANI's officials into Japan to study mechanical logging technology in connection with MLP.

Year	Name	Term (month)	Post
			(upper: when sent. Lower: at present)
1977	Bambang Soebagjo	3	- deputy chief of KPH Cepu - counterpart
	Marinus	3	- trainees section chief, PUSDIK Madiun - counterpart
	Djasmadi	3	- PERHUTANI's Cepu sawmill - counterpart

1978	Adi Hartono	1	– chief of KPH Lawu – chief of KPH Madiun
	Bambang Soeharjanto	3	– counterpart
	Soedibjo	3	– Unit I – counterpart
1979	Djoemhadi	1	– project manager – project manager
	Karjadi	1	– deputy chief of KPH Pekalongan Barat – deputy chief of KPH Pekalongan Barat
	Rachmadi	3	– chief of BKPH Jatipohon, KPH Purwodadi – counterpart
	Kadarisman	3	– KPH Pekalongan Barat – counterpart
	Eddy	3	– Unit II – counterpart

2.6 Model Infrastructure Scheme

As already mentioned in the paragraph 1.2.5, JICA's "project-type" technical cooperation project consists of three fundamental means i.e. expert, equipment and training-in-Japan. Besides that, JICA provides other measures when needed and appropriate to smoothen the implementation of projects.

In the case of MLP, JICA applied "model infrastructure scheme" in 1978, MLP's first cooperation year, in response to the PERHUTANI's request.

Under the said scheme, JICA provided MLP with financial aid (grant) to construct infrastructure necessary for smooth and effective implementation of the project.

- (1) Access road in DF with 1,010 m long and 6 m wide, of which construction cost is Rp.18,200,000.
- (2) Practice yard in PUSDIK compound, of which construction cost is Rp.8,886,000.

These two facilities are being used for the training course along with other facilities provided by PERHUTANI.

2.7 Joint Committee

Following to the attached document of the R/D, the project' work plan is decided at the J/C. MLP held J/C two times in December 1978 and December 1979 during its first two cooperation years.

Main subjects discussed at the J/C are as follow:

- (1) Review and plan of the training course.
- (2) Equipments to be offered by JICA.
- (3) Personnel matter of experts and counterparts.
- (4) Plan of training-in-Japan.
- (5) Facilities to be provided by PERHUTANI.