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Report

Procedures for Topographic Forest Surveys

Prepared By
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April 1998

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Procedures for **Topographic Forest Surveys**

April 1, 1998

Environmental Policy and Institutional Strengthening IQC
OUT-PC806-96-00002-00



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**PROCEDURES for
TOPOGRAPHIC FOREST SURVEYS**

**Inhutani II, Malinau
and the
Center for International Forest Research (CIFOR)**

prepared by

A W Klassen
Forestec Consulting Ltd

April 1, 1998

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TECHNICAL PROCEDURES for TOPOGRAPHIC FOREST SURVEYS

Topographic surveys are usually carried out simultaneously with 100% cruising. This guide book describes a topographic field survey and mapping procedure which is easy to implement and which will permit the production of reasonably accurate contour maps.

1.0 OBJECTIVE

The main objective for conducting a topographic survey is to produce an accurate contour map which can be used to carry out detailed harvest planning and control.

1.1 Limitations

Although the procedure described here is fast and easy to implement, it is also prone to errors. This guide book will identify the major potential sources for error and will suggest ways to minimize and adjust for these errors.

It should be understood that the methodology described in this guide is one of a number of possible different methods which could be used to produce operational contour maps. The choice of this particular procedure for general implementation in the Inhutan II concession at Malinau is based on existing survey skills and familiarity with existing survey practices. The following procedural description builds on existing skills so that the success of implementation can be more assured.

1.2 Assumptions

The survey procedure described in this technical guide, is built on the following assumptions:

- The basic mapping unit will be a +/-100 ha petak utilizing natural boundaries such as streams and ridge lines.
- Parallel strips will be surveyed at right angles from a baseline which will be established through a petak. The baseline should be established at a north/south or east/west bearing. Strips will be established every 20m along the baseline and will be run at a fixed bearing.
- A constant field measurement of 20 horizontal meters will be used to collect data along each strip. Slope corrections will be carried out in the field.

Note The Suunto compass is a commonly used instrument. The most commonly used model does not have a magnetic correction capability, consequently all bearings will be magnetic. When relating field surveys and resulting petak maps to a map base which has been produced from aerial photos, keep in mind that the map base is orientated to true north while your field surveys are orientated to magnetic north. Check your base maps for the magnetic variation in your area.

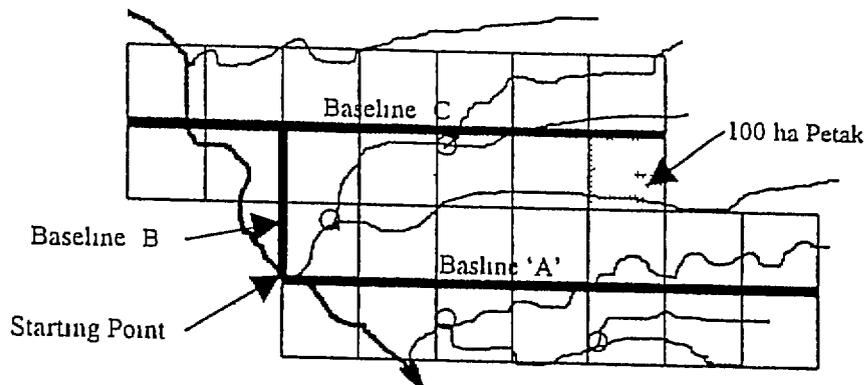


Figure 1 A typical baseline grid (dark lines) projected on a photographic base map showing petaks based on natural boundaries. Circles indicate possible ties to physical features.

2.0 FIELD SURVEY PROCEDURES

2.1 The Survey Team

It is assumed that the topographic survey team will consist of three persons:

Compassman	This is the front man. His job is to establish a straight line according to the desired bearing. He will also cut away any obstacles along the bearing to make the work of the following two men easier.
Head Chainman	This man will pull the survey chain along the cut line and will be responsible for marking each new survey point. He should also check the accuracy of the bearing which has been established by the compassman.
Note keeper	This man holds the chain at the previous survey point. He takes the slope reading and adjusts the survey distance by adding the appropriate slope correction distance to the

measurement according to the slope reading. He records the slope and the actual slope distance needed to achieve a horizontal distance of 20m. He must also record a sketch of the topographic and planimetric detail along the survey line.

2.3 Survey Equipment

Topographic forest surveys require only simple hand instruments. A survey team should be equipped with the following:

- Two hand compasses for each crew. A variety of compasses are available. Make sure all compasses are calibrated consistently (all corrected or not corrected for magnetic declination).
- One clinometer for each crew. Suunto clinometers are the most reliable and durable.
- One altimeter. Gradations should be to the nearest 10m.
- One 35 or 30m survey chain for each crew. If proper survey chains are not available, use a polypropylene rope. The first 20m should have marks at 5m intervals and the remaining section of the rope should have marks at one meter intervals.
- Note book (see Appendix I for a suggested note keeping format).
- Slope tables. Each crew should have a general slope table showing variable slope distances and slopes in percent, as well as a fixed 20m horizontal slope table.
- A supply of plastic tags or survey flagging tape and felt pens for marking survey points.

2.1 Tying to a Controlled Map Base

Petak maps are commonly prepared on a HPH at a scale of 1:1,000 or 1:2,000. These maps can be very useful tools in planning for and in implementing improved operational activities such as skidding and land use planning. However, unless these large scale maps are related to a smaller scale controlled map base, such as the management maps which are available at a scale of 1:20,000 or 1:25,000, the usefulness of the 100 ha petak map will be short lived. If, however, the entire petak map grid is accurately connected to the smaller scale, 1:25,000 map, petak records become meaningful management tools for long-term planning and recording of management activities.

The various methods and considerations for the necessary mapping and survey procedures which can be used to carry out such an activity, will be dealt with in another technical guidebook.

For the purpose of these technical procedures, it will be assumed that a controlled petak grid already exists. If elevations have not already been established for control points related to the petak boundaries and the proposed baseline, a number of methods can be used to determine the starting elevation for a baseline. The easiest method is to use an altimeter which has been calibrated to a known elevation point.

Tip: Use a 25 or 30m chain. The note keeper stays at the last survey point and the head chainman moves ahead.

Tip: The note keeper and the head chainman should compare their height so that the clinometer reading is taken consistently to the same height above the ground.

PETAK 29
JALUR 16

TANGGAL April 1, 1998
AZIMUTH 180°

STAT	J MER	HEL	B TING	ELEV	K ELEV
5					
	20 1	-10	-20		
4					
	20	+5	+10		
3					
	20 4	+20	+40		
2					
	20 2	-15	-30		
1					
	22.5	-51	-102		
0 =	Stat 16 on Baseline A'				

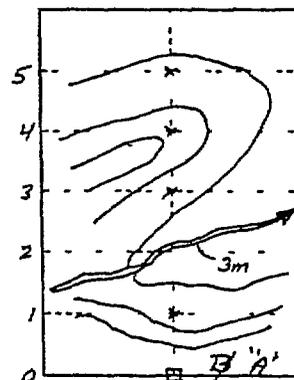


Figure 2 An example of typical survey notes along a fixed bearing line

2.5 Establishing Jalurs

The procedure for establishing the strips or jalurs is the same as for establishing the baseline. The baseline starting point for each jalur has an elevation that has been transferred from the corner of the petak. These baseline elevations become the starting elevation for each jalur.

In order to correct any survey errors, it is recommended that jalurs be surveyed in pairs. The starting point of the first jalur is on the baseline and the end point of the second jalur is at the corresponding baseline station.

The exact distance of Jalur 2 must be recorded to the point where it meets the baseline. Also record the error of closure (bearing, slope distance and slope percent) to the station on the baseline which marks the beginning of Jalur 2. Figure 3 illustrates an error of closure where the second jalur is 5m longer than the first and 4m from the baseline station.

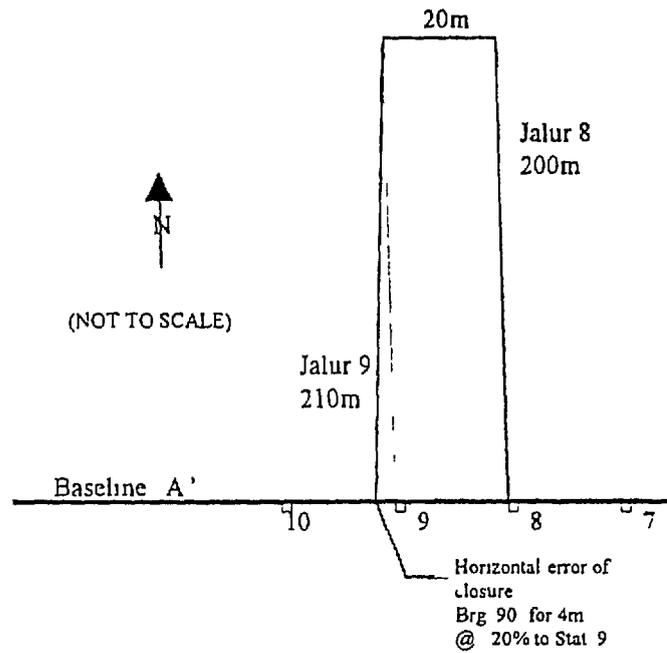


Figure 3 Illustration of a closed traverse

PETAK 28
JALUR 9

TANGGAL April 1, 1998
AZIMUTH 180

STAT	J MER	HEL	B TING	ELEV	K ELEV
= stat 9 on B.A'					
	Brq 90° Ho / -20	-08			
Baseline A'					
10	-5	-05			
	205	-22	-44		
9					

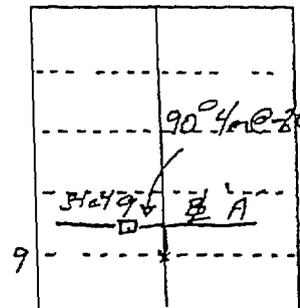


Figure 4 Illustration of note keeping protocol for an error of closure

2.6 Special Situations

(1) Your line is going to cross a deep stream in the next 20 m shot. You would like to know the distance to the stream and the elevation at the stream for the purpose of producing an accurate contour map.

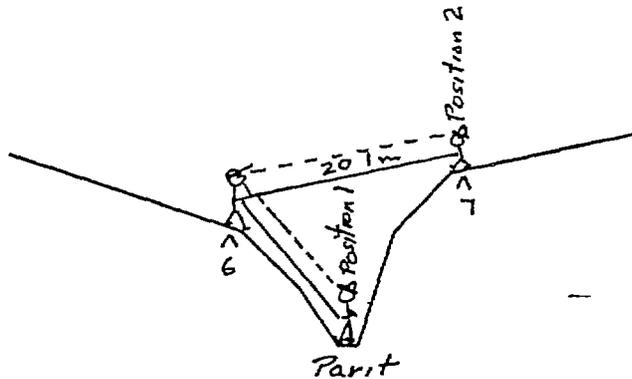


Figure 5 Survey protocol for crossing a stream

Field Procedure

- 1) When the head chainman reaches the stream as he moves forward on the bearing, he will stop for a moment
- 2) The note keeper will take the slope reading and the slope measurement to the head chainman at the stream and record this information as an "intermediate measurement". This "intermediate measurement" should be recorded in brackets opposite the station from which it originates (see sample notes in Figure 6). The note keeper will accurately indicate the stream position on the sketch map and show the direction of flow with an arrow
- 3) The head chainman will then proceed till he reaches 20 m
- 4) The normal survey and note keeping procedure will now apply for slope correction and measurement (see Section 2.4, Establishing a Baseline)

PETAK 28
 JALUR 4

TANGGAL April 1, 1998
 AZIMUTH 180

STAT	J MER	HEL	B TING	ELEV	K ELEV
7				394.8	
	20.1	+10	+20		
6	(10m @ -50%)			392.8	

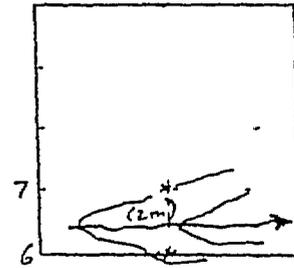


Figure 6 How to record intermediate survey information when crossing a stream or gully

(2) Your line is going to cross a ridge or an abrupt change in slope and the note keeper will not be able to see the head chainman in 20 m

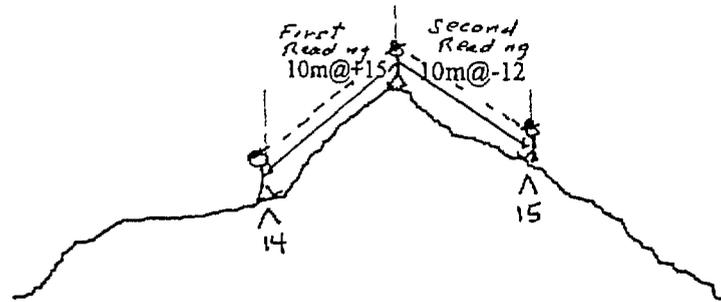


Figure 7 Survey protocol for crossing a ridge

Field Procedure

- 1) As the head chainman reaches the top of the ridge, he will see that he will soon be going down and will be out of sight of the note keeper. He should stop and tell the note keeper to take a slope reading on him.
- 2) The note keeper will take the slope reading and the measurement to the top of the ridge.
- 3) The head chainman will make a mark on the ground with his foot and both men will then proceed along the bearing line.
- 4) When the note keeper reaches the mark on the ground, he will stop and allow the head chainman to proceed until the distance remaining in the 20m interval has been reached.

- 5) The second reading can now be taken in the normal way. Note that the sum of the two distance measurements must equal 20m horizontal distance in order to maintain the constant measurement interval along the line.

Tip: You will need to use the general slope tables for distances other than 20m. Always try to measure to the nearest even meter since these tables are set up in two meter intervals. This will make slope correction much easier.

PETAK 28
 JALUR 15

TANGGAL April 1, 1998
 AZIMUTH 0°

STAT	J MER	HEL	B TING	ELEV	K ELEV
15				361.8	
	10m @ -12		-12		
14	10m @ +15		+15	361.5	

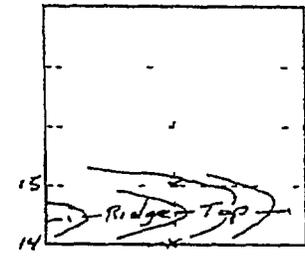


Figure 8 How to record intermediate survey information when crossing a ridge

(3) You're line has reached a large rock which you cannot climb. How do you carry the line forward and still maintain the accuracy?

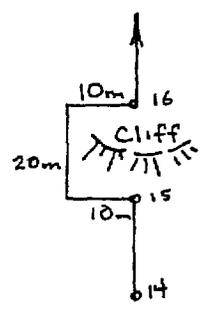


Figure 9 Survey protocol for avoiding an obstacle

Field Procedure

- 1) The head chainman has reached a large rock which he cannot climb. He decides that it is possible to go around the rock to the left of the line.
- 2) He returns to the last survey point and sets a new bearing at right angles to the original line (Bearing 270° in the following example).
- 3) After 10m (or a suitable distance), he checks the original bearing to see if it can get past the rock. If he thinks he can get past, he will tell the note keeper to take the measurement at 10m.
- 4) The note keeper must record the bearing, slope distance and slope % to this off-set point. The head chainman makes a mark on the ground to note the point.
- 5) The head chainman then proceeds at the original bearing of North until he is past the rock and tells the chainman to take the measurement.
- 6) The chainman pulls the chain tight and the note keeper records the new bearing, slope distance and slope %.
- 7) The survey team then proceeds on the reverse of the original off-set bearing for the same distance to get back on the line (90° for 10m).
- 8) The point at which the original line is reestablished should be the next survey point on the line or an even multiple of the standard 20m survey interval.
- 9) To ensure that the measurement interval of 20m horizontal distance is maintained on the line, slope correction using the general slope correction table should be applied to all off-set measurements.

PETAK 28
 JALUR 7

TANGGAL April 1, 1998
 AZIMUTH 0°

STAT	J MER	HEL	B TING	ELEV	K ELEV
16				354.5	
15				342.0	

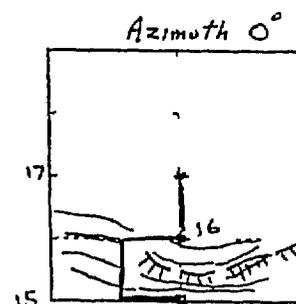


Figure 10 How to keep notes for an off-set around an obstacle

2.7 Potential Sources of Error

Contour mapping surveys are low order surveys. They represent a pragmatic solution to the need for contour maps where aerial photo based contour maps are not available at an operational scale. Since contour mapping is very labour intensive and time consuming, and, since the area which must be mapped within one year is usually quite large, the survey procedure is a compromise between the need for accuracy and the need for production.

It is recommended that all contour mapping strips should be tied to a controlled baseline so that survey errors can be adjusted more easily when preparing the map. The procedure described in the preceding section recommends that two lines should constitute one continuous survey. The survey must close. In other words, the recorded data must clearly describe what was done in the field. Each section of the survey must record bearing, slope distance and % slope.

In order to minimize field survey errors, it is necessary to examine the sources of error. The following list of potential sources of error is by no means complete, however it covers the most common sources of error.

2.7.1 Error in Compass Reading resulting in a deviation of the line from the chosen bearing. This error may be caused by

- (a) Holding the compass incorrectly
- (b) Not checking the bearing line carefully

Corrective Measures

- (a) Always ensure that the compass is held level and that the compass needle (or wheel) is rotating freely
- (b) Take frequent back shots on your line to make sure that you do not deviate from the correct bearing
- (c) The head chainman should also have a compass and should check the bearing of the compassman frequently

2.7.2 Error in Slope Reading resulting in a high vertical error of closure. This error may be caused by

- (a) Using uncalibrated instruments,
- (b) Failing to record the correct sign (+/-)
- (c) Recording degrees instead of percent
- (d) The note keeper is taller (or shorter) than the head chainman but takes his slope readings at the "eye level" of the head chainman

Corrective Measures

- (a) Check the clinometer. It may not be calibrated correctly

- Establish two targets 20m apart. Mark the first target at eye level. Hold the instrument against this mark and establish the zero slope mark on the second target.
- Move the instrument to the zero slope mark on the second target. Hold the instrument next to this mark and establish the zero slope mark on the first target. If the instrument is accurate, the zero slope mark will be the same as the original instrument position.
- If the zero mark is below the original instrument position, the clinometer is reading too low. Determine the correction required by dividing the distance in half and adjusting all subsequent field readings upwards by the resulting angle.
- If the zero mark is above the original instrument position, the clinometer is reading too high. Determine the correction required by dividing the distance in half and adjusting all subsequent field readings downwards by the resulting angle.

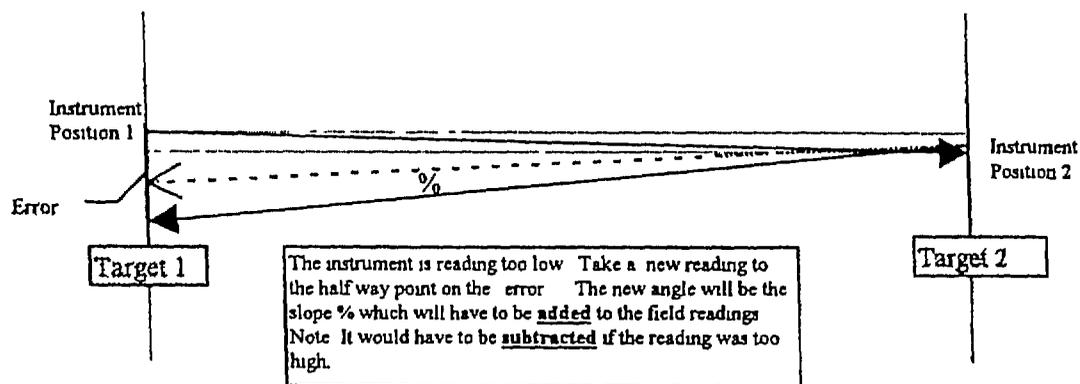


Figure 11 Checking the accuracy of a clinometer

- A much easier way to determine if your clinometer is reading correctly is to take it to a lake or river and shoot across to the opposite shore. Your reading will determine whether your instrument has a negative or a positive bias.
- When adding a slope correction during the jalur survey, take a second reading to the corrected horizontal survey point. Record this second reading.
 - The note keeper should always determine his "eye level" relative to his partner (head chainman) by standing next to his partner on a flat place and taking a zero slope reading on his partner's head.

- 2 7 3 Distance Measurement Error When closing a return traverse along the second jalur to the baseline, the distance should be the same. If it is longer or shorter than it should be but if the bearing is correct, an error in the distance measurement has probably occurred.

Corrective Measures

- (a) Use the correct survey tool. The preferred measurement tool is a nylon survey chain calibrated at one meter intervals.
- (b) Always pull the chain tight and straight when measuring from point to point.
- (c) If using a polypropylene rope, check it periodically against a proper survey tape. Polypropylene will stretch with time.

- 2 7 4 Incorrect, Incomplete or Unclear Notes are a common source of error when attempting to plot the field data.

Corrective Measures

- (a) Always start the notes by clearly identifying the petak number, jalur number, bearing of the jalur, date, and the name of the note keeper.
- (b) Clearly identify any changes of bearing in the notes.
- (c) Make sure that each survey is tied to the next survey line. Record bearing, slope distance and slope for all ties.
- (d) Provide a sketch for each tie.
- (e) Sketch in all creeks and important physical features on the compass sheet.
- (f) Sketch in form lines to illustrate the direction of the contours for 20m on either side of the jalur.

The field notes should be easy for anyone to interpret. Don't leave anything to the imagination. Record all possibly useful information; don't rely on your memory.

3 0 MAPPING PROCEDURES

Low order surveys such as those used in collecting contour information, will always have some error of closure. The key to successful transcription of field data to produce a contour map, is to acknowledge the errors of closure and to adjust for them in a consistent manner. The final map should reflect the corrected errors of closure. This will minimize localized distortion of field data by distributing the errors over a larger map area.

3 1 Assumptions

Certain assumptions are necessary in order to adjust both the horizontal and vertical errors of closure.

- One part of the total survey work must be assumed to be correct. All adjustments will be made to this "correct" survey. The assumed "correct" survey will usually be the baseline, or boundary, survey. All other surveys will be adjusted to this work.
- It will be assumed that an error of closure, both vertical and horizontal, is evenly distributed along the length of the survey. This will make it easier to adjust the error over the total distance of the survey.

3 2 Preparing the Field Notes

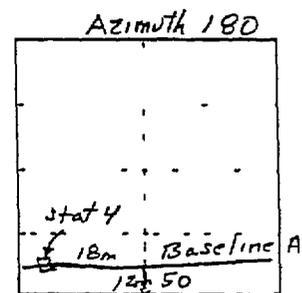
Office Procedure

- 1) Check the field notes for completeness. Make sure that all information necessary to plot the field notes has been clearly noted and that all ties are complete.
- 2) Enter the vertical distances from the slope table. Calculate the elevation for each station.
- 3) Calculate the horizontal error of closure.
- 4) Calculate the vertical error of closure.

PETAK 28
 JALUR 4

TANGGAL April 1, 1998
 AZIMUTH 180

STAT	J MER	HEL	B TING	ELEV	K ELEV
Stat 4 on B "A"				239.4	255.4
51 = Baseline "A"				240.3	
50	12	-10	-12	241.5	



ERROR OF CLOSURE 12 too long,
 18m too far East, 16m too low

Correct elev from
 original baseline survey

Figure 12 An example of completed field notes

3.3 Preparing the Contour Map

Procedure

- 1) Plot the baseline on a piece of graph paper large enough to accommodate the entire survey work, usually one petak. Show all stations and their elevations carried forward from the starting point. This sheet of paper will be used to create a corrected composite map.
- 2) Plot each piece of the survey work on a separate strip of graph paper. All corrections should be made on these individual working maps and then traced onto the composite map.
- 3) On the individual pieces of paper, lightly plot the approximate position of the strips.
- 4) Adjust for horizontal error of closure. The example in Figure 13 shows a closing error of +10m in the north/south direction and +10m in the east/west direction. Assume that this error is equally divided between the two strips.
 - Divide both distance errors by 2
 - Adjust the most northerly end point of each strip by the resulting distance (10/2 = 5)
 - Draw in an adjusted strip position from the actual location of the strips on the baseline to the adjusted end locations (see Figure 13)
- 5) Plot the individual survey points on the corrected strips.
- 6) Transfer planimetric detail such as streams and other physical features from the field notes onto the corrected strip map.

-
- 7) Adjust for vertical error of closure In Figure 13, the correct elevation at station 2 is 468.9m. The closing elevation for the survey of jalur 5 and 6 is 488.9m, therefore, the vertical error of closure is +20.0m
- Divide the error of closure by the number of survey points (20.0m/101 points = 0.198m or, 0.2m)
 - On the field data sheet, enter the corrected elevation in the appropriate column by subtracting 0.2m from each station on the jalurs. Remember that the error is accumulative, therefore, the correction at the first station on jalur 5 is - 0.2m, at the 10th station, the correction is - 2.0, at the 50th or end station of jalur 1 the correction is - 10.0m, etc
 - Write the corrected elevations on the strip map opposite the appropriate stations
- 8) You are now ready to sketch in the contours on the adjusted strip map. Use the field note sheet as a guide to interpreting the direction of the contours. Extend the contours approximately 10m to the east and west of the traverse locations.
- 9) When you have completed and checked all the individual strip maps for the petak, you are ready to start compiling the composite map. On a light table, place the individual strip maps under the large composite map and match the starting points on the baseline. Make sure that the grid lines of the two maps match.
- 10) Lightly trace the planimetric and topographic detail onto the composite map. Be sure to also transfer the corrected strip locations so that it will be easier to plot the individual tree locations.
- 11) When this has been completed, joint up the planimetric detail and contours across the entire map sheet. Make sure that contours are labeled using the actual elevations. Contour labeling protocol requires that the elevations of the contours should always be orientated uphill (see Figure

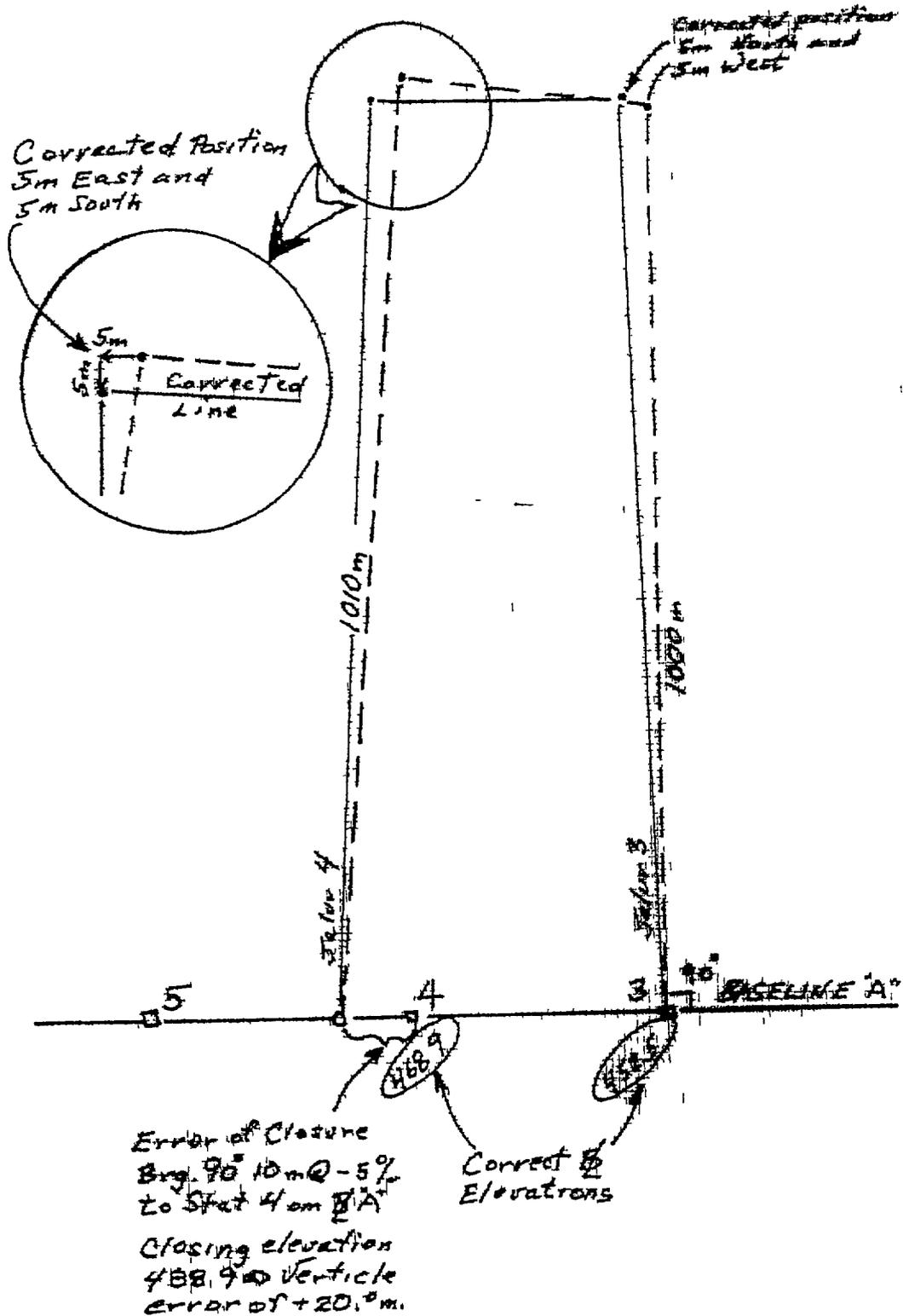


Figure 13 Correcting horizontal errors of closure

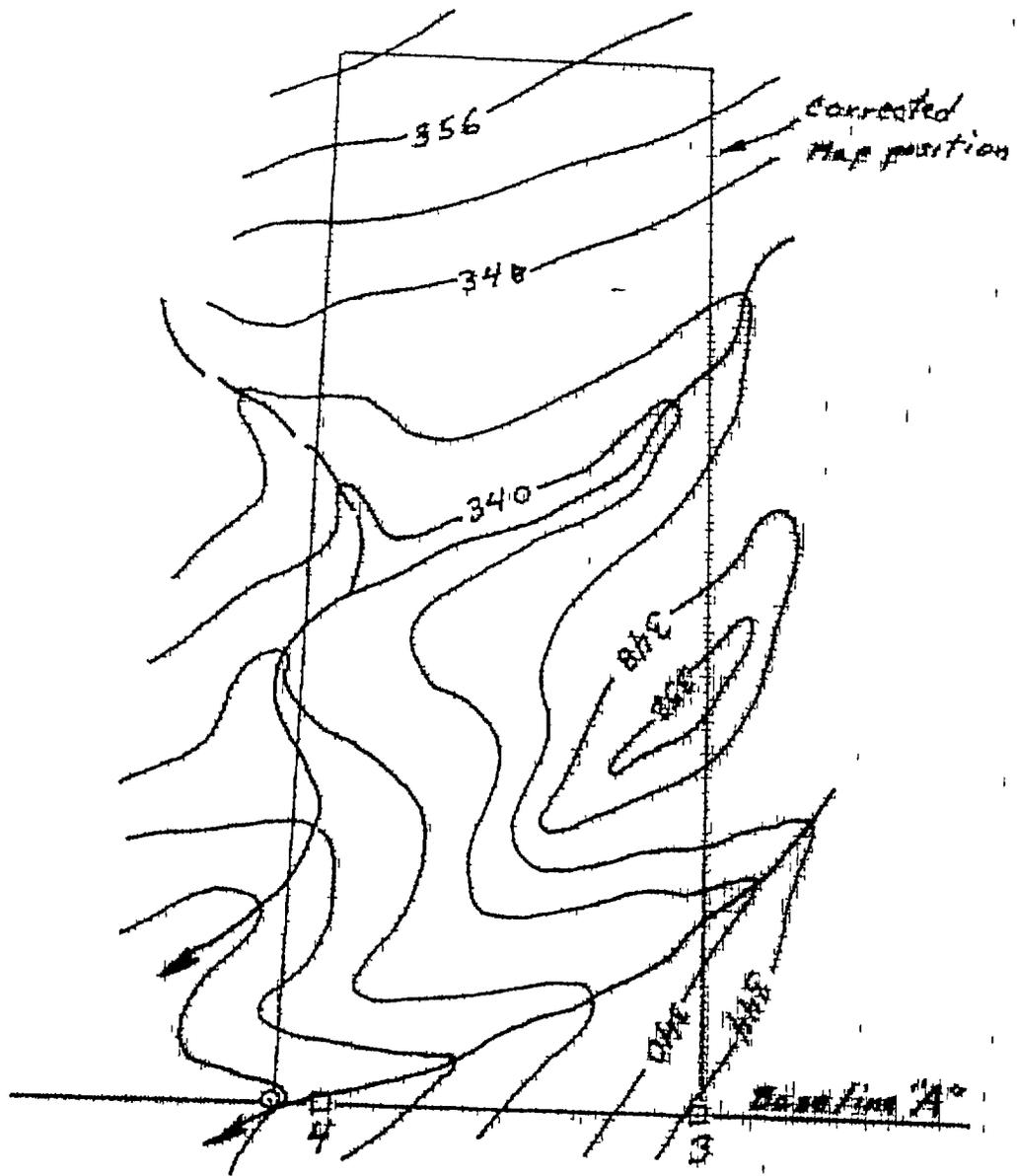


Figure 14 Sample of a completed contour map ready for transfer of tree information

SELECTED ENGLISH - INDONESIAN SURVEY TERMS

Baseline	<i>batas ikat</i>
Block	<i>petak, (usually a 1000m x 1000m operational unit)</i>
Compassman	<i>kompasman</i>
Contour	<i>kontur, transis</i>
Contour interval	<i>interval, jarak antar kontur, skala transis</i>
Corner post	<i>patok betas</i>
Creek	<i>parit</i>
Elevation	<i>elevasi</i>
Gully	<i>celah</i>
Head chainman	<i>penank tali</i>
Horizontal distance	<i>jarak datar</i>
Note keeper	<i>rekord, pencatat</i>
River	<i>sungai</i>
Slope	<i>kelerengan, kemiringan</i>
Slope distance	<i>jarak miring</i>
Stake	<i>ajir, batok</i>
Starting point	<i>titik ikat</i>
Station	<i>stopan</i>
Stream	<i>parit</i>
Strip	<i>jalur</i>
Survey point	<i>stopan</i>
Tie	<i>ikatan</i>
Traverse	<i>survey</i>
Vertical distance	<i>beda tinggi</i>

ECOLABELLING

OBSERVATIONS FROM AN ASSESSOR

Today's discussion concerns itself with ECOLABELLING. Since the Alas Kusuma Group has expressed an interest in having the concession of Suka Jaya Makmur assessed by Lembaga Ekolabel Indonesia (LEI) in the near future, there is obviously a lot of concern within SJM that it must do everything possible to prepare for this assessment mission.

Ecolabelling is quite a new concept to everyone here, therefore, I am sure there are a some questions and perhaps, also some misconceptions. Hopefully through this mornings' discussion, we will be able to answer some of these questions.

- *What is ecolabelling? How does it work? Why is everyone talking about ecolabelling now?*

(OVERHEAD #1 The Market Mechanism and Its' Global Context)

This overhead is a very simplistic attempt to provide a global context for the process of ecolabelling and it's most crucial elements.

(OVERHEAD #2 The Three Main Components of Forest Assessment)

But how does this all relate to the situation here at SJM? I am going to pretend that I am an ASSESSOR and that my specialization is FOREST MANAGEMENT. In the following discussion, I will provide some indication of the kind of information that I will be looking for and the kind of questions that I will be asking you as managers and staff of this HPH.

Keep in mind that my perspective is FOREST MANAGEMENT, not SOCIAL or ENVIRONMENTAL issues. There will be other specialists asking questions directly related to these other issues. In the following discussion, some of the Forest Management concerns will cross over into the Social or Environmental areas. Where this happens, I will indicate by writing "SOCIAL CONNECTION" or "ECOLOGICAL CONNECTION" in *italics*.

Also, please be aware that this is only a partial list of possible questions that an actual assessor might ask. I do not know how LEI will operate or exactly what specific questions they will seek answers for but, I am confident that they will require some information for most of the following questions.

POSSIBLE FOREST MANAGEMENT QUESTIONS

The single most important question that I, as Forest Management Assessor, must address is

- Are the management practices on this HPH adequate to ensure that the current rate of harvest can be sustained (in quality and quantity)?

I would try to answer this question by examining the various aspects of forest management activities and by looking for answers to a lot of questions pertaining to the various aspects of forest management. This would help me to develop an overall impression of the level of forest management being practiced and, through this process, I would be able to get a reasonable impression of whether the practices on this concession will result in a sustainable harvest of forest products.

The nature of my investigations would follow that of an intensive audit. I would be comparing notes with my colleagues from the Ecological and Social Science disciplines throughout this process.

1 Annual Allowable Cut (AAC)

- How is it calculated?
- Are the underlying assumptions reasonable?
- Are the assumptions supported by good data?
- How is the AAC regulated by Government? within the company?
- What have been the historic annual production achievements?

2 Integrity of the Forest Area

- Is the forest area (HPH) defined? in the field? on the maps?
- What lies around the HPH? What are the dynamics of land use? Is the integrity of the forest area secure or is there evidence of erosion of the forest land base?

(SOCIAL CONNECTION)

In this regard, I might want to look at the photographs of the HPH to see if I can see any evidence of recent forest destruction. I might also want to accompany the Social Scientist in his visit to village areas to see if I can see any evidence of recent conversion of the forest into other land uses.

- Is there any evidence of harvesting activities which are outside of the regulated framework (illegal utilization)? What mechanisms do you have to safeguard against this and what are the potential threats to the forest area?
- What organizational arrangements are there to safeguard against biological threats to the forest? (for example, fire)

3 Maps

The management of a forest area is a spatial activity. Maps are an essential aspect of forest management since they are one of the most effective ways of organizing, illustrating, and recording all manner of management activities over large areas of forest. The degree to which maps are used as a management tool is a very useful indicator to assess how well the management of a HPH has grasped the concept of sustainable management and production.

- What maps are available?
- What role do maps play in the planning? in the operational aspects of the HPH? in the recording of harvesting and subsequent management activities (continuous history maps)
- How is information being transferred onto maps? Does it look right? Is it up-to-date?

4 Roads

A forest operations' road network and road construction activities are significant indicators of the company's sensitivity towards environmental concerns. I would definitely be making observations on the condition of the roads as I traveled around the concession and I would be interested to see road construction in progress or recently constructed roads.

- Does the company have road construction standards?
- Are roads being constructed in the best way possible? Is there any attempt to minimize site disturbance (the area occupied by the road) and erosion?
- Is the integrity of the natural drainage patterns being maintained?

5 Harvesting Activity

This is the single most important management activity that affects the success or failure of sustainable forest management. I would want to see active logging areas and areas recently logged. I would want to get a clear impression that the company was doing everything that it could within the constraints of existing technology, to minimize the impact of the harvesting activity on the forest ecosystem (trees, soil, water, biodiversity).

- How is the day-to-day logging activity being regulated? maps? operational guidelines? etc
- The fallers and the tractor operators are the real managers of the forest. What is their sensitivity towards what they are doing? Do they follow any guidelines? Is there an appreciation of a need for best practices?

I would not only look at physical evidence, but I would also expect supervisors and workers to answer any questions that I might have. I would expect to see practical guidelines.

ECOLOGICAL CONNECTION

- Is there evidence of serious environmental deterioration as a result of the skidding activity which could have been avoided? erosion? sedimentation? are any measures being taken to minimize these possible problems during planning? during logging? after logging?

ECOLOGICAL CONNECTION

- Are concerns of biodiversity addressed during the planning for and implementation of the logging activities For example demarcation of protected species, protected areas strategy (excessive slope considerations), riparian management policy and action, etc
- What are the utilization standards like? Are they appropriate?

6 Environmental Aspects

ECOLOGICAL CONNECTION

- What are the policies and practices that relate to environmental protection? and how are they reflected in company action at the planning and operational levels?
- Waste management disposal of workshop waste?
- Biodiversity policies and practices (see item 5)?

7 Post Harvesting Activities

- What policies and action designed to minimize the risk of immediate post harvesting erosion?
- Is management intervention necessary to ensure that the logged over areas recover more quickly from the damage of the logging? If so, what are these actions?
- Planting of skid trails? Meaningful post harvest evaluation? Additional post harvesting management activities (based on assessment of need, not regulatory requirement)?
- Forest nursery program?

I would want to see evidence of these activities in the field where they have been considered necessary

8 Forest Dynamics

ECOLOGICAL CONNECTION

I would be interested to look at the natural forest dynamics, particularly how the forest is recovering from the shock of harvesting activities

- How is the forest recovering from the logging activities?
- Is the recovery adequate both quantitatively and qualitatively to satisfy the concerns of sustainability?
- Can you show me any proof that the ingrowth and growth rates which formed one of the assumptions for setting the 35 year rotation cycle, is actually happening in the field?

There are some very big issues connected with these questions and they are at the center of the AAC/cutting cycle assumptions

I would like to spend a few days walking through logged over areas from different logging periods (ie 5 years, 10 years, 15+ years) I would probably walk transects through the forest and make a subjective evaluation

I would want to see evidence that the company is carrying monitoring and evaluation of the recovery and growth of the logged over forest

Summary

I can not predict how LEI team members will approach the process of assessment for ecolabelling. However, the preceding questions should serve as a rough guide to illustrate the range and type of questions which a Forest Management Assessor is likely to be concerned with

Not all of these questions will require a question and answer approach. Many of the questions will be answered in the Assessor's mind on the basis of the field observation which he (or she) will make during the assessment period

SJM has received the complete set of LEI guidelines. Only some of these guidelines are of direct relevance to you as management and staff of SJM

My impression is that there is very little that you can do in the next month or so before the scheduled assessment by the LEI team. Where my questions indicate an interest in seeing documentary and map evidence, you should prepare yourself by making sure that this evidence is available and easy to interpret. Otherwise the only additional suggestion that I can make is that you understand the likely questions which you will be faced with and think about your response

Remember, the assessment will be about what has been and is actually being done (and visible in the field and in the form of documentary records), NOT about what you INTEND to do in the future

QUESTIONS ??

25

ECOLABELING

PENGAMATAN DARI MATA PENILAI (ASSESSOR)

Oleh Art Klassen
(Diterjemahkan oleh Jeffry)

Topik pembicaraan hari ini berkaitan dengan ecolabeling yang sedang hangat dibicarakan terutama di Suka Jaya Makmur ini. Sejak Alas Kusuma Group berminat untuk menjadikan salah satu perusahaannya PT SJM untuk dijadikan sebagai salah satu perusahaan yang pertama di nilai oleh Lembaga Ekolabeling Indonesia (LEI) dalam waktu dekat, terlihat dengan jelas kepedulian dari SJM dalam menyiapkan diri untuk menghadapi kegiatan tersebut.

Istilah ecolabeling mungkin masih merupakan istilah yang baru untuk orang-orang disini, saya yakin masih ada yang belum jelas dan mungkin juga terdapat salah pengertian akan ecolabeling ini. Mudah-mudahan lewat pembicaraan hari ini, kami bisa menjelaskan secara umum beberapa hal-hal pokok tentang ecolabeling tersebut.

- *Apakah ecolabeling itu? Bagaimana bentuknya? Mengapa semua orang membicarakan ecolabeling sekarang?*

(overhead #1 Mekanisme pasar dan kaitanya dengan pasar global)

Penjelasan yang ada overhead ini hanya merupakan penjelasan sederhana untuk memberikan gambaran secara umum proses terjadinya ecolabeling dan materi-materinya yang terpenting.

(overhead #2 Tiga komponen utama dan Penilaian Hutan)

Tapi bagaimana semua itu kalau dikaitkan dengan situasi yang ada di SJM ini? Saya akan berpura-pura bertindak sebagai salah seorang tim penilai ecolabeling di bidang Manajemen Hutan. Selanjutnya, saya akan memberikan gambaran apa yang akan saya lakukan dan pertanyaan apa yang akan saya berikan kepada manajer dan staff dari perusahaan ini.

Harap selalu diingat bahwa saya seorang pakar Manajemen Hutan bukan pakar Sosial atau pakar Lingkungan. Ada pakar-pakar lain yang akan mengurus bidang-bidang tersebut. Walaupun demikian, ada beberapa aspek dari Manajemen Hutan yang berkaitan dengan bidang Sosial atau Lingkungan pada pembicaraan ini. Kalau hal itu terjadi saya akan memberi tanda "SOSIAL" atau "LINGKUNGAN" dalam huruf *miring*.

Juga perlu diingat ini hanyalah sebagai gambaran dan hanya sebagian dari kemungkinan hal-hal yang akan ditanyakan oleh tim penilai yang sebenarnya. Saya tidak tahu bagaimana LEI bekerja atau pertanyaan apa-apa saja yang akan diajukan, tapi saya yakin mereka akan memerlukan informasi-informasi yang berkaitan dengan pertanyaan dibawah ini.

Pertanyaan yang kemungkinan keluar sehubungan dengan Manajemen hutan

- Pertanyaan yang paling penting yang akan saya berikan kalau saya seorang Penilai Manajemen Hutan adalah

▪ Apakah kegiatan pengelolaan yang dilakukan di perusahaan ini dapat menjamin panen yang berkesinambungan (baik kualitasnya maupun kuantitasnya) ?

Saya akan mencari jawabannya dengan cara mengamati beberapa aspek pengelolaan dengan cara mengajukan pertanyaan-pertanyaan yang tersangkut dengan masalah ini. Ini akan menolong saya untuk membuat perkiraan "kelas" pengelolaan yang sedang dilakukan. Lewat proses ini saya akan dapat membuat gambaran apakah praktek pengelolaan perusahaan akan menghasilkan panen yang berkesinambungan.

Cara saya melakukan pengamatan mengikuti cara audit yang intensif. Saya akan membandingkan catatan saya nanti dengan pakar Ekologi dan pakar Ilmu Sosial.

1 Annual Allowable Cut (AAC)

- Bagaimana menghitungnya?
- Apakah perkiraannya cukup beralasan?
- Apakah perkiraannya didukung oleh data yang akurat?
- Bagaimana AAC di terapkan?

2 Keadaan areal hutan

- Apakah areal hutan diketahui di lapangan? dalam peta?
- Daerah apa yang berbatasan dengan HPH? Bagaimana perubahan penggunaan lahan? Apakah keadaan hutan stabil atau ada bukti erosi pada lahan?

(ASPEK SOSIAL)

Sehubungan dengan ini, saya mungkin akan ke lapangan untuk menemukan apakah ada bukti-bukti tersebut pada kegiatan logging yang baru berlangsung. Saya mungkin juga bersama-sama dengan Pakar Sosial pergi mengunjungi desa-desa untuk melihat dampak dari perubahan fungsi hutan terhadap penggunaan lahan disekitar mereka.

- Apakah ada bukti-bukti pemanfaatan hutan yang berada diluar peraturan yang digariskan (pemanfaatan illegal)? Apa mekanisme yang dilakukan untuk menghindari pemanfaatan ilegal tersebut?

Bagaimana pengaturannya untuk melindungi areal hutan dari ancaman terhadap ekologi hutan? contohnya, bahaya api)

3 Peta

Pengelolaan hutan adalah kegiatan yang berskala luas. Peta merupakan aspek penting dalam pengelolaan hutan, karena penggunaan peta merupakan cara yang paling efektif dalam pengaturan, memberikan gambaran, dan mencatat semua hasil kegiatan pengelolaan hutan dalam skala yang luas. Seberapa jauh penggunaan peta sebagai

alat pengelolaan, merupakan tanda sejauh mana pengelola perusahaan (HPH) menerapkan konsep pengelolaan dan pemanenan yang berkelanjutan

- Peta-peta apa saja yang ada?
- Seberapa jauh peranan peta tersebut dalam perencanaan? dalam kegiatan operasional perusahaan? dalam pencatatan kegiatan logging yang sudah dan yang akan dilakukan?
- Bagaimana informasi tersebut dipindahkan kedalam peta? Apakah sesuai dengan kenyataan di lapangan? Apakah selalu diperbaharui?

4 Jalan

Jaringan jalan HPH dan kegiatan konstruksinya merupakan indikator yang penting dari kepedulian perusahaan terhadap lingkungan. Saya pasti akan melakukan pengamatan di sepanjang jalan dalam perjalanan di dalam HPH dan akan tertarik untuk melakukan peninjauan terhadap pembuatan jalan yang sedang berlangsung atau yang baru saja dibangun

- Apakah perusahaan mempunyai standar pembuatan jalan?
- Apakah jalan dibangun sebaik mungkin menurut keadaan di lapangan? Apakah ada usaha untuk meminimalkan kerusakan pada lokasi (daerah yang digunakan untuk pembuatan jalan) dan erosi?
- Apakah keadaan pola aliran sungai dijaga?

5 Pembalakan

Ini merupakan kegiatan pengelolaan tunggal yang paling penting yang sangat menentukan keberhasilan dari pengelolaan hutan yang berkelanjutan. Saya akan tertarik untuk melihat areal pembalakan dan areal yang baru di logging. Saya akan tertarik untuk mendapat gambaran yang jelas bahwa perusahaan melakukan kegiatan sebaik mungkin dengan menggunakan fasilitas yang ada, untuk meminimalkan dampak dari kegiatan pembalakan terhadap ekosistem hutan (tegakan tinggal, tanah, air dan keanekaragaman hayati)

- Bagaimana kegiatan pembalakan hari-perhari diatur? peta? pedoman pelaksanaan? dll
- Penebang dan operator traktor merupakan pengelola hutan yang sebenarnya. Sejauh mana tingkat kepedulian mereka terhadap apa yang mereka lakukan? Apakah mereka mengikuti peraturan yang sudah digariskan? Apakah ada keinginan dari mereka untuk mencapai hasil yang terbaik?
- Saya tidak hanya akan melihat bukti-bukti yang ada di lapangan, tapi juga akan mengharapkan mandor dan pekerjanya untuk menjawab setiap pertanyaan yang mungkin saya ajukan. Saya akan tertarik juga untuk melihat petunjuk teknis (juknis)

(EKOLOGI)

- Apakah ada bukti penurunan mutu lingkungan sebagai akibat kegiatan penjarahan yang seharusnya bisa dihindarkan? Erosi? Pengendapan? Apakah ada pengamatan dan pengukuran yang dilakukan untuk meminimalkan hal tersebut sewaktu dalam perencanaan? Sewaktu pembalakan? Sesudah pembalakan?

(EKOLOGI)

- Apakah kepedulian terhadap keanekaragamanhayati dimasukkan kedalam perencanaan dan dalam pelaksanaan kegiatan pembalakan? Contoh pemisahan/perlindungan terhadap spesies yang dilindungi, strategi daerah yang dilindungi (atas pertimbangan kemiringan), pengelolaan daerah aliran sungai dan pelaksanaannya, dll
- Bagaimana standar pengelolaan? Apakah bermanfaat?

6 Aspek Lingkungan

(EKOLOGI)

- Apa kebijaksanaan dan pelaksanaan kegiatan yang berkaitan dengan kelestarian lingkungan? dan bagaimana pengejawantahannya dalam kegiatan perusahaan baik pada tingkat perencanaan maupun operasionalnya?
- Pengelolaan limbah bagaimana pembuangan limbah hasil kegiatan?
- Kebijaksanaan mengenai keanekaragamanhayati dan pelaksanaannya (lihat point ke 5)?

7 Kegiatan setelah pembalakan

- Apa kebijaksanaan dan kegiatan yang direncanakan untuk meminimalkan risiko erosi setelah pembalakan?
- Apakah keterlibatan perusahaan diperlukan untuk memastikan bahwa areal sesudah pembalakan akan membaik dari kerusakan yang ditimbulkan oleh pembalakan? Kalau benar, apa bentuknya?
- Menanam kembali di bekas jalan sarad? Manfaat evaluasi setelah pembalakan? Tambahan kegiatan setelah pembalakan (berdasarkan kebutuhan, bukan berdasarkan peraturan dari kehutanan)?
- Program pembibitan?

Saya akan tertarik untuk melihat bukti-buktinya di lapangan dimana perlu

8 Pertumbuhan Hutan

Saya akan tertarik untuk melihat pertumbuhan hutan, terutama bagaimana hutan kembali tumbuh setelah "kejutan" dari kegiatan pembalakan

- Bagaimana perkembangan hutan setelah kegiatan pembalakan?
- Apakah pertumbuhannya mencukupi baik secara kuantitatif maupun kualitatif untuk mencapai keberlanjutannya?
- Dapatkah anda buktikan bahwa riap pertumbuhan yang sebelumnya diperkirakan bisa untuk rotasi 35 tahun terjadi di lapangan?

Ada beberapa masalah pokok yang berhubungan dengan pertanyaan tersebut, dan itu berhubungan dengan asumsi AAC/rotasi penebangan

Saya akan tertarik untuk menyempatkan diri melihat keadaan hutan bekas tebang untuk beberapa hari pada saat yang berbeda-beda Saya mungkin membuat transect menembus hutan dan membuat evaluasi yang subjektif

Saya akan tertarik untuk melihat bukti pengamatan yang sedang berlangsung atau evaluasi yang dilakukan oleh perusahaan terhadap perkembangan dan pertumbuhan hutan setelah pembalakan

Kesimpulan

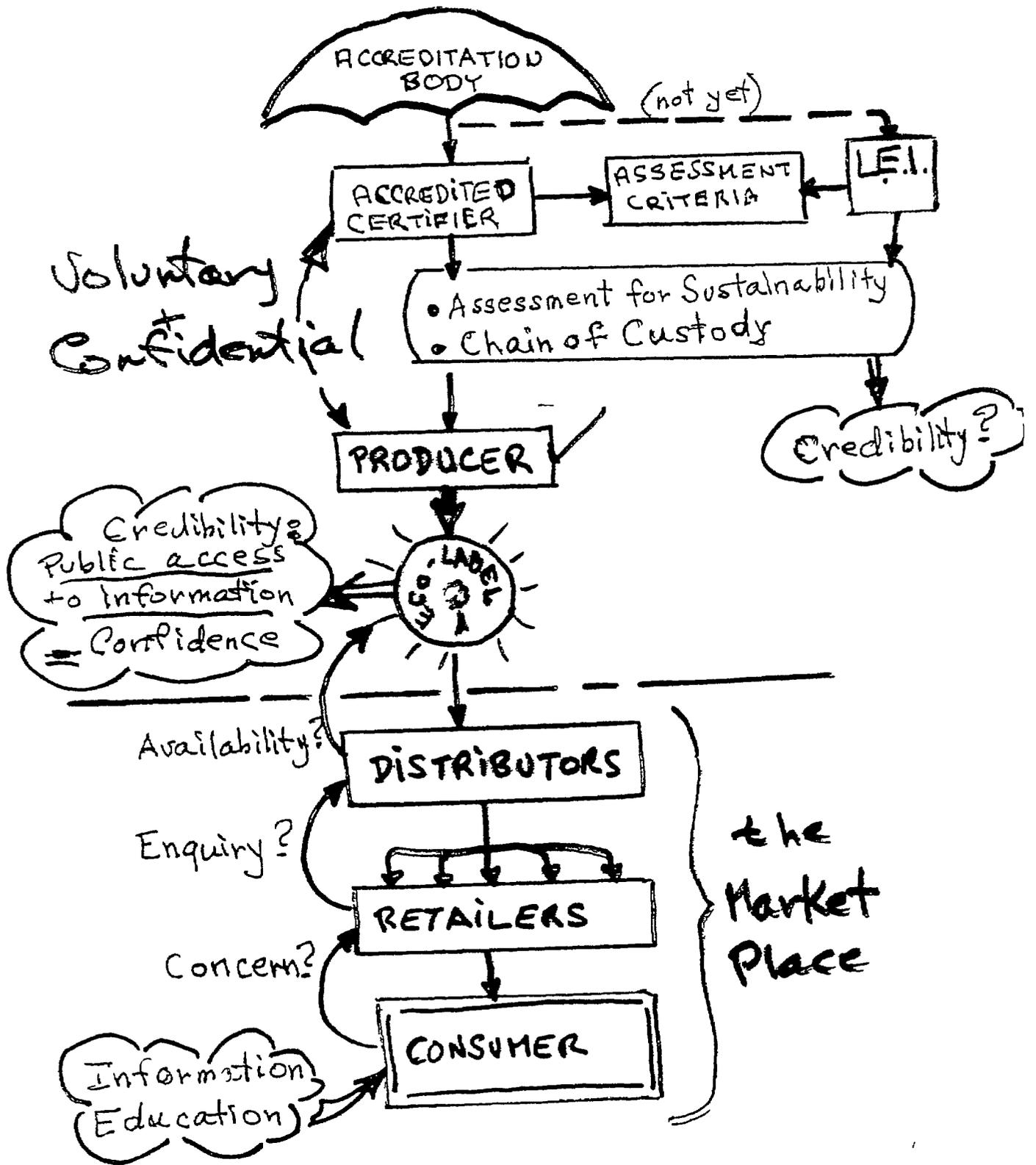
Saya tidak dapat memperkirakan bagaimana tim dari LEI akan melakukan kegiatan penilaian ekolabeling setepatnya. Bagaimanapun, pertanyaan-pertanyaan di atas mungkin dapat dijadikan pedoman dasar sebagai gambaran apa yang akan ditanyakan oleh Penilai Manajemen Hutan

Tidak semua pertanyaan ini membutuhkan pertanyaan dan jawaban secara lisan. Kebanyakan dari pertanyaan akan dijawab oleh Sang Penilai sendiri berdasarkan pengamatan yang dilakukannya di lapangan

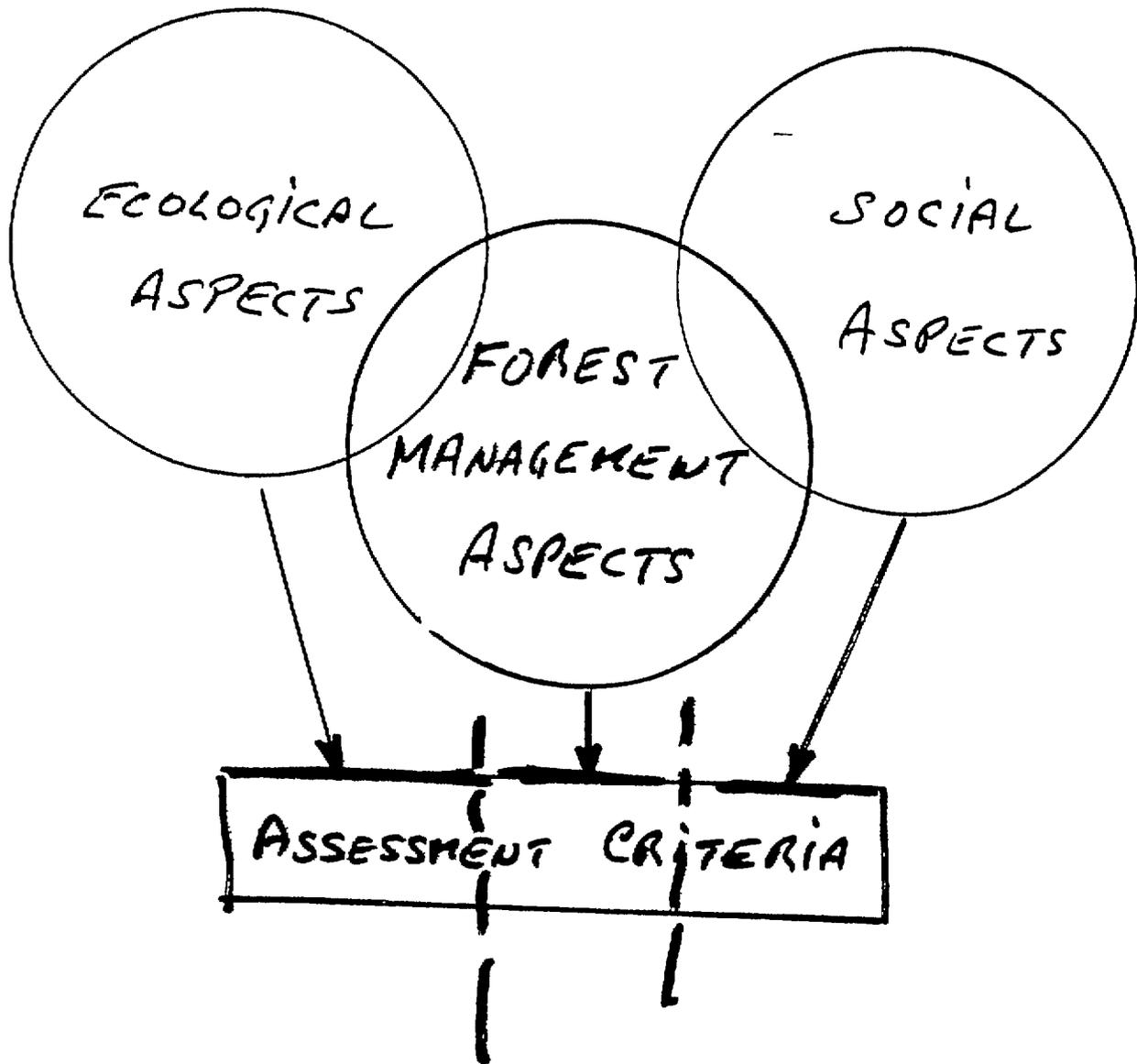
SJM sudah mendapatkan copy lengkap dari pedoman LEI. Hanya beberapa petunjuk yang berhubungan langsung kepada anda sebagai manajer dan staff SJM

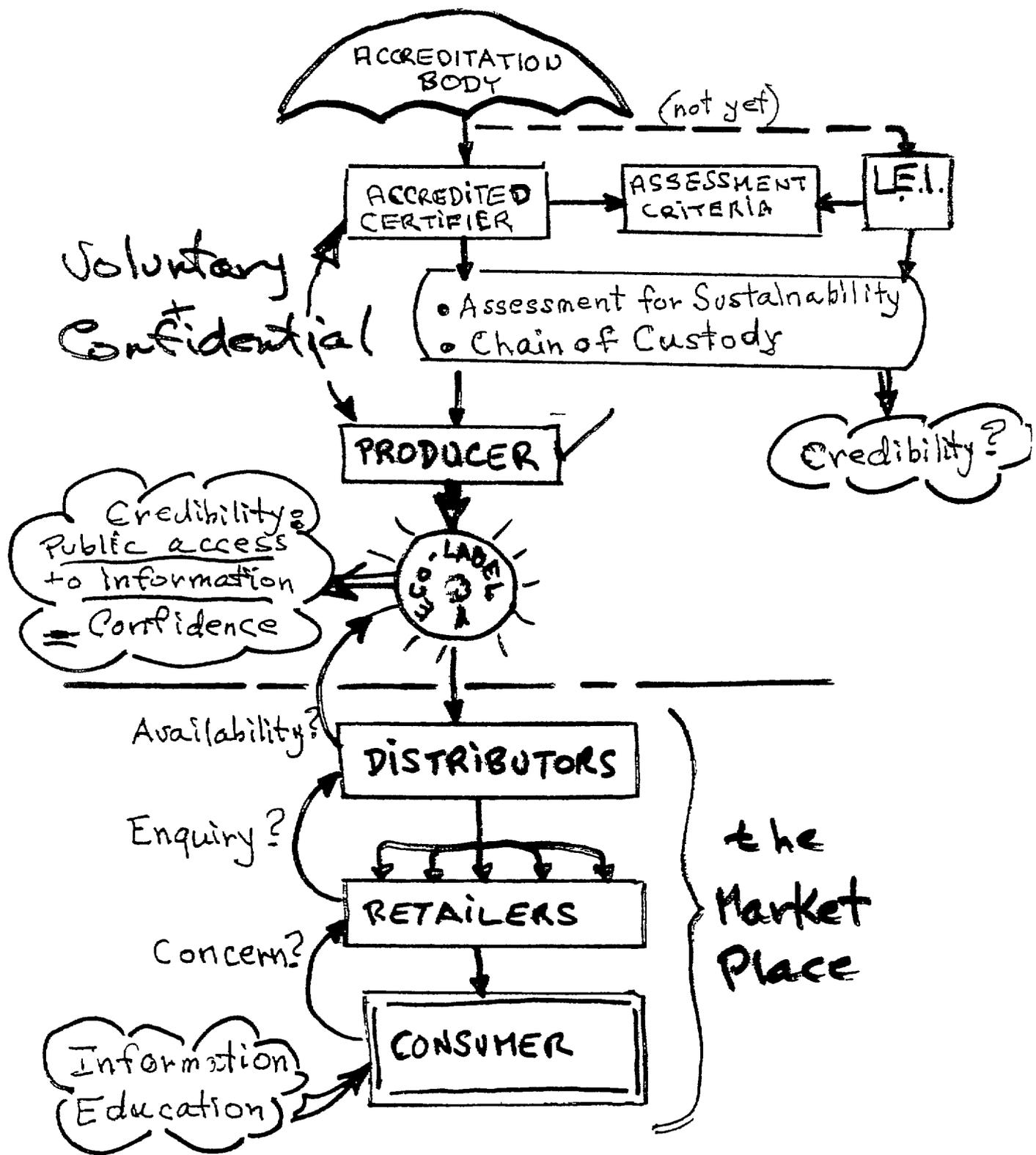
Menurut pendapat saya, hanya sedikit yang akan dapat anda-anda sekalian lakukan dalam beberapa bulan yang akan datang sebelum Tim LEI datang. Sehubungan dengan ketertarikan saya yang berhubungan dengan bukti peta-peta dan dokumen-dokumen, sebaiknya dipastikan bahwa bukti-bukti tersebut tersedia dan gampang diinterpretasikan. Kalau tidak, tambahan saran yang dapat saya berikan ialah anda-anda mengerti jenis pertanyaan apa yang akan diajukan dan memikirkan jawabannya

Harap diingat, penilaian dilakukan berdasarkan apa yang sedang dilakukan (dan dapat dilihat di lapangan dan dalam bentuk dokumen), BUKAN berdasarkan apa yang AKAN dilakukan di masa yang akan datang



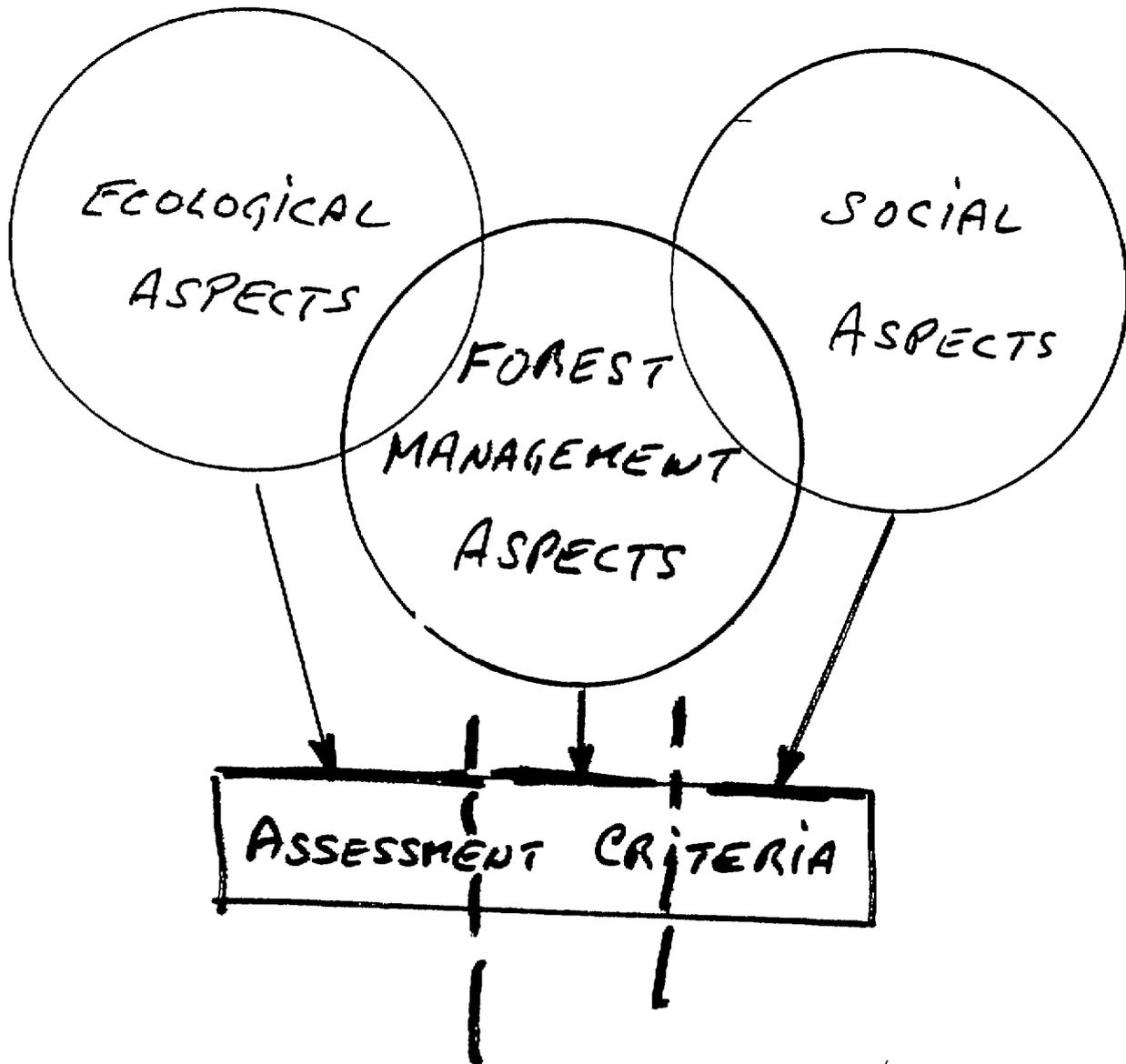
ASSESSMENT for ECOLABELLING: THE STANDARD APPROACH





ASSESSMENT for ECOLABELLING:

THE STANDARD APPROACH



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April 3, 1998

TO Jim Tarrant
NRN-2

SUBJECT INTERIM SUBMISSIONS

Jim,

Attached please find the following

- 1 *"Procedures for Topographic Surveys"* prepared for CIFOR. A similar procedures manual was prepared for the Alas Kusuma Group
- 2 *Daily Diary* detailing my activities during this consultancy up to and including my return journey. A further accounting of time will be submitted along with final Consultancy documentation
- 3 *Ecolabelling Observations from an Assessor* prepared for an all day workshop held for Alas Kusuma at SJM. Attachments are in the form of brief handout notes in English and Indonesian

Various other overhead material and notes have been prepared during the course of this consultancy. I haven't attached them since they are rather meaningless taken out of context of the various forums for which they were prepared

I shall be submitting by e-mail, the following items

- 1 A brief Consultancy report
- 2 A brief paper outlining the key elements of RIL. This is to be prepared and submitted prior to the RIL workshop at the MoF. I will also e-mail a copy of this to Pah Silva Hutabarat
- 3 A "first draft" of an article on RIL which will hopefully be submitted for publication

I am not sure how much of all this material Winnrock needs to receive as fulfilment of my contract obligations. Perhaps you could advise on this

Regards


A. W. Klassen

**A W KLASSEN
DAILY DIARY**

**NRM-2 CONSULTANCY,
February - March, 1998**

- Feb 4 Travel to Vancouver for business visa to Indonesia
Met with Softree to discuss existing software (ROADENG)
capabilities with respect to contour mapping and tree location
mapping, prices, support services, hardware requirements, etc
- Feb 16 Created a petak map mock-up for demonstration purposes on
ROADENG to be used to illustrate mapping possibilities for the
Alas Kusuma/NRM involvement and CIFOR's possible use
-
- Feb 17 Left for Indonesia
- Feb 18 Overnight in Hong Kong
- Feb 19 Arrive in Jakarta
Meeting with Plinio Sist to discuss my involvement with CIFOR on
secondment from the NRM-II timing, funding arrangements,
TOR, etc
- Feb 20 Orientation meetings in Jl Madiun office
- Feb 21 Meeting with Pakh Nana, Alas Kusuma Group to discuss objectives
and timing for field visit to the Suka Jaya Makmur concession in W
Kalimantan
- Feb 22 Sunday
- Feb 23 Meeting with Silva Hutabarat Silva reiterated his request for help
in developing guidelines, particularly RIL Promised to start
something as part of the second consultancy this year after
establishing **practical and implementable field protocol**
Met with Robert de Kock, Sen Info Mgmt Systems Advisor for the
ODA to talk about the ODA's plans for operationalizing RIL
Meeting with Jim Jarvie, Bill Maynard and Mubariq Ahmad to
discuss avenues of NRM involvement in the LEI certification
process

- Feb 24 Submitted work schedule to J Tarrant which outlined two months of work involving training of Alas Kusuma staff at Suka Jaya Makmur as well as training Inhutani/CIFOR staff at Bulungan Work schedule also allowed time for write-up of an article on RIL in Canada as well as time to complete a computer generated contour map for CIFOR
Met with Mubariq Ahmad to discuss, in detail, possible future consultant input to the LEI/NRM cooperation
- Feb 25 Travel to Pontianak
Afternoon meeting with Gusti, Tri Harjanto, Wardio, Wawan and Izefri(NRM) regarding the objectives and activity schedule for the next two weeks
- Feb 26 All day meeting in Alas Kusuma office, Pontianak Meeting dealt with establishing a clear understanding of present petak mapping protocol and developing a training strategy to address the identified shortcomings The objective is to help SJM develop the capability to **produce and use** contour maps for operational planning and control (RIL)
Evening meeting with Ronnie Cherry *et al* concerning progress on implementation of the Gunung Palung buffer zone management project
- Feb 27 Travel to Ketapang and on to Suka Jaya Makmur (1 75hr by speed boat to Sei Kelly and 1hr by road to base camp)
- Feb 28 SJM base camp Intensive discussions with theoretical and practical aspects of field survey and mapping procedures needed to produce reliable contour maps
- Mar 1 Three hour trip to operational camp Begin work of contour and tree mapping in a previously mapped petak All participants in the field training exercise worked as a team Overnight in operational camp
- Mar 2 Participants divided into 4 teams and continued field survey work A total of 14 5 ha mapped, half at a strip intensity of 20m and half at a strip intensity of 40m Returned to base camp
- Mar 3 All participants in the office dealing with the data processing of the field information
- Mar 4 Continue plotting field data to produce a controlled contour map

- Review and summary of field survey and mapping protocol based on field and office exercise. This basic training proved very useful in highlighting some of the practical difficulties and enabled the development of a pragmatic protocol. This experience will form a significant basis for the development of **technical guidelines**.
- Mar 5 Office training in RIL planning. Used uncontrolled form line maps produced for this year's logging area. Discussed and demonstrated the use of contour maps, considerations in skid trail planning, etc.
- Mar 6 Field training in RIL. Walk-about in petak 00020. Examined two skid trails which have been located by Pakh Asep, i/c of skid trail planning and location. Overnight in Ewok Camp.
- Mar 7 Field training in RIL. Walk-about in petak NNN18 and NNN19. Attempted to use existing contour maps for orientation and demonstration of some of the considerations in skid trail location. Maps are totally useless. Asep is doing the best he can but at this point in time, the maps are more of a hindrance than a help. Very steep terrain.
- Mar 8 Base camp office. Prepared summary of petak mapping and RIL training. Prepared outline and overheads for discussion concerning ecolabelling. Izeфри prepared translations.
- Mar 9 All day workshop. Morning reviewing the survey and mapping procedures. Still a lot of questions. Afternoon presentation on ecolabelling. Overview followed by playing the role of a forest management assessor - very active participation.
- Mar 10 Field trip to forest nursery. Stop at various sites to discuss erosion control measures, etc. Gusti arrived from Pontianak office in the afternoon. Discussions concerning future direction and needs. Discussed ways in which to incorporate environmental/biodiversity concerns into operational planning and action.
- Mar 11 Office discussions concerning petak mapping, ecolabelling, base map control, etc. Urgent request for some kind of a rough draft procedural guidelines covering the field survey and mapping protocol. Alas Kusuma intends to implement this protocol on all its

- concessions in W and C Kalimantan Discussions re future inputs from NRM-2 and what Alas Kusuma/SJM will do to prepare Begin preparation of technical procedures write-up
- Mar 12 Continue work on technical procedures write-up Travel to Ketapang
- Mar 13 Travel to Pontianak Debriefing meeting with Pah Mamat attended by Gusti, Harimawan, Ewin and Buddhi (SBK) Meeting carried enthusiastically by Harimawan and Gusti Submitted rough draft of contour mapping procedures manual
- Mar 14 Travel to Jakarta
- Mar 15 Sunday
- Mar 16 Start with some of the write-up for completed work Planning meeting with Plinio Sist re the proposed training at Bulungan
- Mar 1 Continue with write-up Preparation for Bogor workshop on proposed guidelines for reduced impact logging
- Mar 18 Workshop at Bogor on guidelines for reduced impact logging Gave presentation on training for contour mapping and forest inventory Workshop attended by Inhutani II, CIFOR personnel and representatives from some of the major players like Berau, ODA, etc
- Mar 19 Report write-up and preparation for Bulungan field trip
- Mar 20 Meeting with Silva Htabarat, Nana Suparna (Alas Kusuma) et al Discussed progress NRM-2 work with Alas Kusuma Strong request for NRM-2 input into the development of "generic" RIL guidelines Promised delivery of such guidelines to Silva and NRM-2 well before April 15 at which time an all party workshop on RIL will be sponsored by the MoF Pah Nana and Gusti likely to attend as representatives of the Alas Kusuma/NRM initiatives Meeting at Jl Madiun with Andy Curtin, Juan Seve, et al re some policy issues related to the NRM-2 position of forest management initiatives
- Mar 21 Begin work on RIL guidelines
- Mar 22 **CIFOR** - Travel to Tarakan, E Kalimantan (Sunday)

- Mar 23 **CIFOR** - Travel to Malinau
- Mar 24 **CIFOR.** All day workshop on contour mapping field procedures and cruising field procedures for the CIFOR RIL study area preparation Fourteen participants from Inhutani II
- Mar 25 **CIFOR** Begin field training in contour mapping Established baseline separating petak 28 and 29
- Mar 26 **CIFOR** Continue with field training in contour mapping Participants divided into 3 teams
- Mar 27 **CIFOR** Continue with field training One crew on cruising and one on contour mapping
- Mar 28 **CIFOR** Two crews on contour mapping and one on cruising Return to base camp, Malinau
- Mar 29 **CIFOR** (Sunday) Full day in the office with crews plotting their field work Lots of problems coming out as a result of sloppy field work
- Mar 30 **CIFOR** Continue with mapping of the composite contour map Review and re-emphasis on the need to follow the field protocol set out on the first day Review of mapping (error management) procedures Review of cruising protocol Travel to Tarakan in the afternoon
- Mar 31 **CIFOR** - Return to Jakarta
- Apr 1 Preparation of final draft of procedures manual on contour mapping
- Apr 2 Meeting with NRM-2 staff and consultants regarding the formulation of a forestry sector work plan
- Apr 3 Meeting Nana Suparna of Alas Kusuma re progress achieved during this consultancy and planning for next visit
Meeting with Mubariq re possible participation in a LEI assessment as an observer
Meeting at CIFOR as a wrap-up of the Malinau training session and discussion on future collaboration
- Apr 4 Depart for Hong Kong
- Apr 5 Arrive in Canada (Sunday)