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DEPARTEMEN KEHUTANAN  
SEKRETARIAT JENDERAL  
PROYEK PENGEMBANGAN PERENCANAAN KEHUTANAN

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**STUDY INITIAL STEPS IN THE  
DESIGN OF HUMAN RESOURCES DEVELOPMENT  
STRATEGY TO SUPPORT IMPROVED ENVIRONMENTAL  
AND NATURAL RESOURCES MANAGEMENT**

**FINAL REPORT**

**OCTOBER 1993**



PT. Nakarya Sembada  
Consultants

**MANAGEMENT & ENGINEERING CONSULTANTS**

JL. BRAMJAYA No. 37 KEBAYORAH BARU JAKARTA SELATAN TELP. 710933 PO. BOX 128 JKS98. TELEX: 47243 PACTO KRI IA FAX 3803818



PT Nakarya Sembada  
Consultants

MANAGEMENT & ENGINEERING CONSULTANTS

JL. BRAWIJAYA NO 37 KEBAYORAN BARU JAKARTA SELATAN 1710933 PO BOX 6826 JKSRJ TELEX: 47243 PACTO KM IA FAX: 35539 7

INKINDO NO 02852 P. 0269DKI

Nomor : P.93.10.350

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Pemimpin Proyek Pengembangan

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Jl. Jend. Gatot Subroto

J A K A R T A.

Perihal : Final Report Pekerjaan Study Initial Steps in The Design of Human Resources Development Strategy to Support Improved Environmental and Natural Resources Management (Versi Bahasa Inggris).

Dengan hormat,

Memenuhi kewajiban kami sesuai dengan kontrak No. 05/KON/P3K/93 dan Surat Perintah Kerja No. 16/SPK/P3K/93 tanggal 28 Mei 1993, bersama ini kami sampaikan 15 (lima belas) eksemplar laporan Final Report Study Initial Steps in The Design of Human Resources Development Strategy to Support Improved Environmental and Natural Resources Management (Versi Bahasa Inggris).

Demikianlah kami sampaikan untuk dapat diterima sebagaimana mestinya.

Hormat kami,

✍ PT. Nakarya Sembada Consultants



PT Nakarya Sembada  
Consultants

A. Hidajat Bermawi  
Direktur Utama

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# CHAPTER I

## INTRODUCTION

### 1.1. Background

United Nation Conference on environment and development held in Rio de Jaeniro in 1992 produced an international consensus on the forestry principles. The purpose of that consensus was to regulate the management, conservation and sustainable use of forest functions. It was also stated that forest management and conservation are of government concern, because forest has important values for human needs, local people needs and the global environment.

In the mean time, ITTO has prepared a guideline for the sustainable forest management, both for natural and man-made forest. Additionally, a Ministry of Forestry Decree No. 252/93 on the Criteria and Indicators of the Sustainable Management of Natural Production Forest in Indonesia has been announced. These two documents (ITTO's guidelines and Ministry decree) showed the steps that should be done to manage the forest in a sustainable way.

Up to now, forestry development has been focused on the increase of physical production, service and other protection aspects of the forest, whereas the result of the development effort are highly determined by " the man behind the gun". The effectiveness of other production factors. However, human resources seldom receive proper attention. Considering the importance of human resources in the second stage of Indonesia's long-term development plan, therefore it is the time for us to pay more attention to the improvement of the quality of human resources. Professionals (forester, agronomist, biologist, etc) are needed in the sustainable forest management. They should have knowledge and insight on the impacts of any treatment applied to the forest and to other resources.

The major concern in forestry activities is the use of forest resources based on the sustainable yield principle. Science and technology have caused forestry activities that are applied exceed the forest boundary. The forestry activities have reached centers of settlements, considering that forest management is influenced by it's environment. Forest managers begin to pay more attention to socio-economic aspect related to the forest, including soil and water protection and catchment areas protection. They also concen

about urban forest as are of the necessity in urban environment. Therefore we can not neglect the influence of socio-economic aspects in the management of our forest resources. Thus, this will start with concentrating on the needs for professional man power in forestry and environment, because they are the most important part, in any resource management activity.

In order to support the increase of the use of natural resources, something important has to be done, i.e. review of every process in the developing of human resources, which include planning, preparing for the education program and training for the man powers. This task should be done carefully, because it concerns future goals and objectives (i.e. to provide highly qualified professionals who will do and implement any effort to fulfill the needs of the society).

The scope of improving the quality of natural resources and the environment is extensive. Therefore the realization of this task should be started from the basic truth, i.e. the improvement of human resources, especially those who will apply the treatments to natural resources and the environment.

This study will examine any lack of human resources, lack of training and efforts to improve the quality of human resources. Which are needed in the development of forestry and economy.

## **1.2. Problems**

To bring into the goals of development, Indonesia has two major resources i.e. the rich natural resources and large quantity of human resources. With more than 140 ha of forest area, Indonesia has become one of the countries which has the largest tropical forest area in the world. To take care of this natural resources and environment we need proper man powers in terms of quality and quantity.

Problem faced is how to provide good quality of professional man powers.

### 1.3. Aims, Objectives and Goals of the Study

As stated in the TOR, this study on The Initial Steps in the Design of a Human Resources Development Strategy to Support Improved Environmental and Natural Resources Management is aimed at examining the needs for the development of human resources in the sustainable development. Especially in developing the natural resources management, the task of the consultant in this study are :

- First : To identify professional man power who will handle the natural resources and environment, and identify role and function of those man powers in assuring the sustainable management.
- Second : To identify the kind of basic knowledge that the man powers should master and to identify analytical and logical ability of those professional man power.

Based on those identification then several things will be developed, i.e :

- a. Education or training for the candidate of professional who will manage the natural resource in concern.
- b. Knowledge, logical and analytical ability needed to that the professionals can do their job property.
- c. Preparing programs on the human resource development.

### 1.4. Methods

#### 1.4.1. Study Activities

To fulfill the goal of this study, two kinds of approaches will be conducted, i.e. :

- a. Literature study and secondary data collection.  
This activity is aimed at examining previous studies in the related field and collecting data and information on the condition of human resources, especially those who work on the natural resources and environment in Indonesia.

b. Survey

This activity is aimed at gathering opinion and views from several levels of society about how human resources should be if they serve to conduct a sustainable management of the natural resources and environment.

1.4.2. Approaches

Identifying the professional man power needed for the sustainable management of NR and environment will be approached by analysing the second stage of long-term national development goals related to natural resources and environmental protection, especially forest resources. The investigation will be focus on every policy stated in Broad Guideline National Policy (GBHN) 1993 and also those stated in the The Sixth Five-year Development Plan (Pelita VI).

The result of analysis will show activities related to the NR management. Furthermore, by looking at the structure and functional official status in the Ministry of Forestry and other related ministries we will examine the needs for professional man powers based on their role and function in the NR management. The next step will be a confirmation of this result with experts and scientists so, that we will get a consensus on the professionalism in NR and environment management. Surveys and interviews will be conducted to reach this goal. It is expected that the result will show in detail what kind of professional needed to support the sustainable management of NR and environment.

Comperative analysis will be conducted to examine present condition and ideal condition. Based on the analysis we will develop a formulation on how to improve the quality of man power in every sector of development.

1.5. Scope

This study emphasis on the examination on the needs for professional to manage forest resources. Therefore, it will include study on any matter pertaining to man power in all levels of government and private institutions.

## CHAPTER II

### FOREST AND NATURAL RESOURCE DEVELOPMENT

#### 2.1. Objectives and Goals of Forest and Natural Resources Development

##### 2.1.1. Broad Guidelines of National Policy (GBHN)

It was emphasized in GBHN 1993 that the second long term development plan was aimed to increase human resource quality. Further more, the utilization of natural resources should be well planned, national, optimal and responsible, based on peoples capability, taking consideration of sustainable function and equilibrium of environment. It should also be emphasized that the development of forest and mining must count both today's and tomorrow's welfare. GBHN was also warned us the natural resources management tend to destroy environment. Therefore, in managing this natural resources, it is important to maintain the quality of environment.

In policies of Pelita VI (Five-years Development Plan), it was stated that the forest development should be increased for (1) industrial development (2) employment opportunity, (3) devisa, (4) regional development. Besides, we need to continue having proper forest function, i.e. (1) maintain hydrology, (2) source of germ plasm, (3) maintain soil fertility, (4) climate control, etc. Therefore, actions to be taken are (1) forest protection, (2) proper management, (3) monitoring, (4) control, (5) rehabilitation and (6) conservation. Water, soil and land which have economic value and social function should be integratedly managed. Furthermore, it is also stated that the land-use and water usage was also integratedly managed in order to obtain sustainable function of natural resources and environment. Special attention should be taken for conservation and rehabilitation of critical land, maintenance of water catchment and other water resources.

GBHN also stated that marine development should be directed to entrance bio-diversity, utilization and culture of marine resources, and also maintain the sustainable ecosystem supported by science and technology.

GBHN stated that in the development in forestry sector will be conducted by :

- a). Maintaining forest functions
- b). Maintaining hydrological function of the land
- c). Increasing job opportunity
- d). Increasing source of devisa, national and regional income
- e). Managing forest to ensure national income and guarantee local peoples welfare.

Development of timber and non-wood production should be carried out through :

- a). Improvement of production forest, community forest and industrial man-made forest (industrial plantation)
- b). Efforts to increase productivity of natural forest which supported by supplying good quality of seedlings and proper silviculture.

Table below shows kinds of activities/actions that need to be done :

---

A. Major Actions

- a. Ecosystem protection
  - b. Restoration of critical forest land
  - c. Increase social participation
  - d. Forestry entrepreneur and increase diversity of forest products.
- 

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B. Supporting Actions

- a. Extension
  - b. Education and training
  - c. Rules and Regulation
  - d. Improve access to get information
  - e. Research and development.
-

### 2.1.2. Forestry Development Plan in Pelita VI

There are 16 strategic matters that need attention to accomplish the goals and objectives of forestry development (as stated in the draft of Repelita VI), i.e :

- 
- a. Preparation of precondition in forest management
  - b. Improvement of Forest Resources Productivity
  - c. Market Development
  - d. International Issues
  - e. Control of Forest Resources and the Environment
  - f. Rehabilitation of critical land, especially those located in water catchment areas
  - g. Conservation of natural resources
  - h. Development of science and technology
  - i. Diversification of forest products and services
  - j. Forest exploitation by forest concession owner
  - k. Development of industrial plantation (HTI)
  - l. Control of shifting cultivation
  - m. Development of human resources quality
  - n. Institutions
  - o. Rules and Regulation
  - p. Control/supervision
- 

Draft of Repelita VI also stated 50 steps in the implementation of Pelita VI. This study simplifies those steps into 29 steps, i.e :

- 
1. To accelerate the implementation of forest/natural resources inventory
  2. To establish fixed forest areas
  3. To accelerate the establishment of forest boundaries
  4. To make and provide maps
  5. To develop the resource management in production forest
  6. To develop production of timber and non wood products
  7. To improve management of forests as an ecosystem
  8. To maintain natural forest productivity
  9. To improve professionalism in forest entrepreneur
  10. To optimize function of institution in the development of forest entrepreneur
  11. To increase social participation
  12. To improve maintenance and protection of biodiversity
  13. To improve and carry on the restoration and reforestation, especially in critical forest land
  14. To continue and improve soil conservation and the greening/ plantation program outside the forest area
  15. To continue the development of community forest
  16. To continue the development of community forest system
  17. To increase productivity of industrial plantation and to control/stop illegal forest cutting
  18. To improve control of shifting cultivation
  19. To improve the development of protected area management (including national parks, marine parks, recreation forest, hunting parks, etc)
  20. To increase the role of research centers and accelerate the application of efficient and effective technology
  21. To improve the quality and quantity of researchers
  22. To encourage cooperative researches
  23. To develop agency for regional research and development (UPT)
  24. To increase the quality of human resources
  25. To improve education, training and forestry extension
  26. To draw up rules and regulation and to complete the existing ones
  27. To improve the quality control in forestry development
  28. To conduct international network on forestry development
  29. To increase the quality of officials.
-

### 2.1.3. Forest Function

Considering the direction, objectives, goals and steps that will be taken in the forestry development, the condition of natural resources should be given more attention. Based on its function, forest can be grouped into three categories, i.e. : (1). Forest and Nature Reserves (HSA), (2). Protection Forest (HL) and (3). Production Forest (HP). Forest and Nature Reserves are areas established to give protection to the natural ecosystem processes, especially to save the existence, diversity, originality, uniqueness and special characteristics of germ plasms, flora and fauna population, ecosystems and any natural phenomenon. Efforts to protect the HSA are carried out to support the development in science and technology, education and socio culture related aspects. For that reason, any active treatment is not allowed in HSA. It is expected that HSA grow and develop naturally. Human interference should be restricted to maintain the existing condition and keep it for any disturbance. Therefore, HSA cannot be converted to other usage. Additionally, the location of HSA should not be exchanged with other location.

Protection Forest (HL) management is directed toward giving protection to the hydrological function of the land, such as flood control, erosion control and also maintaining soil fertility of the surrounding areas. Considering its functions, the location of protection forest (HL) should not be exchanged with other location. Converting HL to other usages also is prohibited.

In the existing regulation, HL and HSA might be located in a protected area, i.e. an area, which because of its natural condition, has protection functions. Criteria for the classification of protected areas are as follow :

a. Area which gives protection function to other areas and subsidiary areas.

#### 1. Protection Forest Area

Definition : Protection forest area is an area which has unique characteristic that capable to give protection to the surrounding areas. The protection mentioned are in terms of hydrological regulators, flood prevention and maintenance of soil fertility.

Protection objectives : To prevent erosion, flood and sedimentation, and to maintain hydrological function so that it can ensure the availability of soil nutrients, surface and ground water.

Criteria :

- a). Forest area with slope factors, type of soil and amount of rainfall that reach the value of more than 175 according to the Ministry of Agriculture Decree No. 837/Kpts/m/n/1980, and or
- b). Forest area with slope greater than 40 % (Inmendagri/3/1985) and, or
- c). Forest area located 2000 m about the sea level and up.

## 2. Peat areas

Definition : Peat areas are areas with soil formation dominated by partially carbonized vegetation matter.

Protection objectives : To control regional hydrologic function, i.e. to provide water catchment areas and flood mitigation, and also to protect unique ecosystem in the area.

Criteria : Peat soil with 3 m thick or more in the upper course of the rivers

## 3. Water Catchment areas

Definition ; Water Catchment areas are areas with high capability to infiltrate rainfall so that the areas become aquifer exchange and function as water resource.

Protection objectives : To give enough space for water to infiltrate and to prevent flood.

Criteria : High amount of rainfall, special characteristics of soil structures and geomorphology so that the area is capable to infiltrate water in large amount.

## b. Local Protection Areas

### 1. Coastal Border

**Definition :** Coastal border is an area along the coast that has important role in maintaining the coastal functions.

**Protection Objectives :** To protect coastal areas from any activities that may disturb the function of coastal ecosystem.

**Criteria :** Coastal area with width proportionate to the physical condition of the coast, at least 100 m from the highest up tide towards inland.

### 2. River Border

**Definition :** River border is an area along the river banks, including man-made canal and primary irrigation ditches, and capable in maintaining the river functions.

**Protection Objectives :** To protect rivers from any disturbance (decrease of water quality and stream flow, decrease of physical condition of river banks and river bottom, etc) caused by human activity.

**Criteria :** At least 100 at both sides of major rivers and 50 both sides of smaller rivers outside the settlement areas (Ministry of Agriculture decree No. 837/Kpts/Um/1980). River border in settlement areas are areas along the river banks which are large enough to establish inspection roads (10 - 15 m).

### 3. Area Around Lake/Dam

**Definition ;** Areas surrounding lake/dam are areas located around lake/dam and have important role to maintain the functions of lake/dam.

**Criteria :** Including a minimum radius of 200 m from the spring, with the exception for the use of public interest (Ministry of Agriculture Decree No. 837/Kpts/Um/11/1980).

### c. Nature Reserves and National Heritage Reserve

#### 1. Nature Reserves

Definition : Natural Reserve areas are areas represent unique ecosystem and provide important natural habitats for a diversity of flora and fauna.

Protection Objectives : To protect biodiversity, ecosystem types, special characteristic and natural phenomenon for the sake of conservation of germ plasms, science and global development.

Criteria ; Natural Reserve areas consist of nature reserve, game reserve, recreation forest, wilderness areas (areas for wildlife protection) and game refuge.

#### 2. Coastal Mangroves

Definition : Coastal mangrove areas are coastal areas dominated by mangrove vegetation and have roles in protecting the life of marine and coastal biota.

Protection Objectives : To conserve the existence of mangroves as an ecosystem and as breeding habitats for marine biota, besides its function as barrier for abrasion and protection to agriculture land behind the mangrove area.

Criteria : A minimum of 130 x average value of difference between highest and lowest annual up tide, measured from the lowest tide toward inland.

#### 3. National Park, Provisional Forest Park and Recreation Park

Definition ; National park is conservation area managed with zoning system and directed toward the development of science, tourism, recreation and education. Provisional forest park (Taman Hutan Raya) is a natural conservation area that especially designed for collection of wild and introduced flora and fauna, either natural on product of captive breeding, development of science, education, cultivation, tourism and recreation. Natural recreation park is a conservation area either terrestrial or equatic (marine) which especially is designed for tourism and outdoor recreation.

#### 4. National Heritage Reserve and Scientific Areas

Definition ; National Heritage Reserve and Scientific areas are areas where ancient architecture with important historical values are located, or areas with unique natural geological shape formation.

Protection Objectives : To protect national heritage treasure in form of historical heritage, diversity of natural geological formation, and national monuments from natural and human disturbance.

Criteria : Location or sites of ancient heritage with high archaeological value, areas with unique geological formation and contribute to science. The criteria of national heritage reserve are based on the Monumen Ordonantie Staats blad 1931 no. 230.

#### d. Areas Sensitive to Natural Disasters

Definition : Areas that often suffer from natural disaster or has high potential to suffer from natural disaster.

Protection Objectives : To protect people and their activities from natural disaster (directly and indirectly).

Criteria : Areas with are identified as often suffer from and has high potential to suffer from natural disasters (such as volcano eruption, etc).

Based on its condition and location, HP consists of three forest types i.e. Restricted production forest (HPT), permanent or common production forest (HPB) and production forest that might be converted to other usage (HPK). Establishment of HP was directed to produce timber and other non-wood product for the sake of society and industry. In the management of HP social function of the forest and environmental protection should be given attention. In the management of HPT important aspects that should be given special consideration so that disturbance from the logging activities will not disturb the surrounding areas are soil condition, amount of rainfall, topography, etc. In principle, the location of HP can be exchanged with other and HP can be converted to other usages such as agriculture, plantation, etc.

#### 2.1.4. Management of Forest Reserve and Natural Conservation

According to IUCN (1989), conservation is the management of water, soil, minerals and other organism to achieve higher quality of humans life. The management activities include surveys, researches, administrative works, preservation, utilization, education and training. In that sense, there are two things that need to be given attention :

First : There are value systems useful for human kind that should be maintained.

Second : People may utilize those value that they maintain.

In practice, conservation activities include :

1. Maintaining natural succession of vegetation until they reach climax condition
2. Maximizing energy flow in every physical and climatic condition
3. Maintaining animal population which already has been adapted to the existing vegetation condition.

Therefore, as long as there's no interference to the climax condition conservation means, preservation or protection. But if the communities are not in climax condition (before climax) then conservation means management. It should be noticed that in this situation do nothing is one of management activity.

In 1980 IUCN together by UNEP and WWF published a document that mention 3 goals of conservation i.e. :

1. Protection of essential ecological processes and life support systems
2. Preservation of genetic resources (germ plasms)
3. Sustainable use of species and ecosystem.

National park is one type of conservation areas. Its management is unique because of recreational function added to other functions as conservation areas. Therefore, other than its role as nature protection, NP also has important role in regional development, and those are supported by some benefit from NP i.e:

1. NP as genetic resource
2. NP support ecosystem equilibrium
3. Education, training and research facilities
4. Recreation facilities and
5. Part of local and regional development.

TN development should be directed toward optimalization of NP function. This can be achieved by integrating the development of NP into regional development.

Nowaday, activities concerning NP management include :

1. Designing which include surveys, setting the boundary and site planning
2. Establishment of the area i.e activities that include effort to get legal status of the area
3. Spatial arrangement of the area i.e activities to classify the area into zones (zoning activity). In this activity plot zone boundaries are established. Zonation in NP is aimed to facilitate the management utilization and development and NP. Consideration in zoning include factor of bio-ecological conservation, geology, landscape architecture etc.
4. Management of fauna, flora and ecosystem i.e. intensive activity to maintain the existence of flora and fauna and ecosystem. Activities include inventory, classification of natural resources, rehabilitation and other habitat improvement
5. Management of buffer zone i.e. any activating that stimulate society and local people to understand the importance NP and to do their agriculture activity in that zone
6. Tourism : activity to guide public and visitors to do mental and physical type of recreation
7. Research and education ; activities that drive all levels society to use the area as natural lab and source of useful knowledge for their daily life
8. Extension i.e. : activities that stimulate the society to increas then interest on keeping the areas from any disturbance. Type of disturbances so far are : illegal harvesting of timber and other non wood products, illegal hunting, illegal land acquisition, fire, uncontrolled livestock feeding, etc
9. Development of facilities i.e. activities to improve the value of TN and increase intensity of management
10. Protection and guarding i.e. activities to prevent disturbance from human activities. This include application of sanction to the violators. Major activities are : patrol,

cooperative action, making of sign boards and development of coordination among related institution.

In addition to terrestrial NP, there is also marine NP. Problems faced in managing the marine NP basically are similar to problems in managing terrestrial one.

## 2.1.5. Management of Protection Forest

### 2.1.5.1. Function of protection forest

Traditionally, protection forest function only in regulation of water yield and protection against erosion. In fact, if it is considered more deeply, protection can function also in protection of biodiversity. This idea stems from the fact that the growth of protection forest should proceed naturally. Human interference should be given only in limited extent to help the development of natural succession on damaged forest area.

The urgency to manage protection forest stems from the thinking that forest ecosystem is a producer of water and serve as rain water storage facility, whereas engineering activity such as construction of dam, waterways, ditches, dike etc, constitute only as conveyor of raw materials in the form of water to the consumer. Consumers of raw materials in the form of water, can be in the villages (for instance farmers) or in the cities (for instance industry, drinking water plant etc). Because of this, the policy to ensure protection forest existence as freshwater producer, is increasingly needed (Manan 1978).

In principle, the management of protection forest is a management of natural biological resources. Management of biological natural resources in protection forest, comprise all processes which occur in ecosystem. This requires understanding of ecological principles, appreciation toward the occurring ecological process in the protection forest and acceptance of the concept that management of protection forest constitute a management of specific form of space utilization.

The management of the ecosystem of protection forests requires high technology and great responsibility. There are two models of protection forest management, i.e :

First : To leave it like it is. This is the easiest and the cheapest methods in protection forest management.

The decision to keep the natural processes goes the way as it is without any interference from human activities, is in fact a special management decision. Furthermore, this needs a careful consideration.

Second : To conduct manipulative management which also needs careful consideration.

Protection forest as explained in the UU no. 5/1967 is a forested area which because of its natural characteristics is allocated for hydrological control, flood and erosion prevention and soil fertility maintenance. The UU no. 5/1990 about Natural Resources Conservation and the Ecosystem mention that protection forest also has function to conserve biodiversity and protection regional ecosystem.

Protection forest which cover an area of  $\pm$  30 million ha, is distributed in 27 provinces, from DI Aceh through Irian Jaya. Because of this extensive distribution, the protection forest may consist of various types of ecosystem. In general, the ecosystem of protection forest can be categorized into humid region protection forest, arid region protection forest, mountain region protection forest and coastal region protection forest. Because the environment of the protection forest varies, the structure and species composition of the forest also varies. Even, in a certain protection forest area, there will be micro variation in the ecosystem. Therefore, each ecosystem of protection forest will have different species diversity and hence a unique genetic diversity.

If protection forest is considered as having the primary function in hydroorologic regulation, then protection forest can also serve as ex-situ biodiversity conservation area which function :

1. as genetic conservation area for various species of plants and animals
2. as center for study and information on plant and animal biodiversity
3. as germplasm source which is highly needed for development
4. as demonstration area for extension purposes for community, scientist and practitioners
5. as a facility to develop tourism, either for scientific tourism or recreational tourism
6. to improve the image of Indonesia in International scope in the field of natural resource conservation.

By considering the above mentioned functions, the mangement of this biodiversity conservation area, require input of accurate information. Because of that, a general plan for management of these area, need a careful consideration for each existing ecotype.

Beside the protection function, the area of protection forest can also be utilized directly in limited extent. Forest product can be harvested as long as this activity does not endanger its function.

At present, there are many unauthorized activity of harvesting by various parties. Uncontrolled and unmanaged harvesting of forest product can deteriorate the function and intactness of protection forest. If this harvesting (gathering) of forest product is allowed, it should be :

1. Supervised closely
2. Limited in a certain authorized zone
3. Limited in time, for instance in certain season only.

Other previsions which will be developed in the management of protection forest are related with development, education, research, forestry extension and development of science and technology, development of monitoring system and inventory of protection forest.

#### 2.1.5.2. Pattern of management of protection forest

Considering the above mentioned problems, then the pattern of protection forest management can be developed by the following items.

##### a). Area establishment of protection forest

At present, protection forest area is still indicative in its feature, based on the map of consensus forest land use (TGHK). According to the consensus forest land use, protection forest is established based on the physical criteria of the area, without considering the factors of land converage and socioeconomic aspect of the people. As a consequence, unconformity occurs in terms of boundary criteria between the map and those in the field. It is often found that a certain area which has become exploited land, is appointed to be protection forest. On the other land, other area which is unsuitable (as protection forest), is appointed as protection forest. To overcome this problem, criterias need to be developed for establishing protection forest in more operational manner. Beside that, it is recommended that the existing criteria is added with the following items (IPB 1993) :

- a. Area of tide affected swamps and coast
- b. The present existing land use
- c. Land suitability
- d. Distribution of human population and its socioeconomic aspect.

b). Development of buffer zone

Buffer zone is an area which is either inside or outside the protection forest area, which functions to buffer the disturbance toward the area. In order to optimize the function of this buffer zone, a through study is needed to decide the appropriate zone. In this buffer zone, it is expected that there are some resources available to be developed and utilized by the surrounding people. Because of this, the establishment of buffer zone should be conducted by micro survey. The results of this survey are used to determine the feasibility of a certain area to serve as buffer zone for the protection forest.

c). Accessibility pattern of protection forest

The managed protection forest need to monitored and tended in accordance with the area development. Pattern of forest transportation system (PWH) in protection forest is different with that production forest. Road inside the protection forest area which is usually used for patrolling and area management, should also be connected with public road outside the area, so that the management in the regency and provincial level have sufficient access to monitor the physical condition of the area.

Several items which need to be considered during the opening up of protection forest is the type of construction and road pattern which are allowed to be established. Most of the area is situated in steep slope and are mostly susceptible to erosion.

d). Pattern of personnel unit

Although at this moment management units of protection forest has not been clear yet, the objective which is desired to be achieved is the formation of Protection Forest Management Forest Unit (KPHL). The development of this unit (KPHL) is still in its embryonic stage. However, activities related with physical implementation in the field is expected to be as follows (IPB 1993) :

- a. area and spatial arrangement
- b. boundary establishment and maintenance
- c. development of forest opening up activity and its physical facilities
- d. rehabilitation of area and maintenance
- e. maintenance of area ecosystem

- f. development of buffer zone
- g. development of science and technology laboratory
- h. development of outdoor recreation area
- i. guidance for the people surrounding the area.

With the types of activity as mentioned above, then the development of personnel is adjusted to these activities. Professionals are needed for the implementation of activity, as well as for area management at various levels of management.

#### 2.1.6. The management of Production Forest

At present the utilizing production forest is done by Concession Forest System (HPH). The HPH holder has to manage the forest and utilize the forest product mainly wood with wise system in order to avoid the destruction of the environment. This duty as stated on several regulation and guidance is issued by the government. In the meantime HPH is also an economic institution. Therefore the HPH holder also consider the enterprise and economic principle in order to develop its activity. So the HPH should consider two importance principles, the economic activity in order to receive the highest income from his commercial activity and the government principle whose hopes that the utilization of forest is in the frame of protecting the natural environment. Other than that currently the population and the society around the area are need strong attention. They need assistance and guidance in their endeavour of accelerating their prosperity. For this purpose the government give the obligation to HPH holder to develop the community around forest area.

##### 2.1.6.1. The Purpose of Concession Forest

In its decree, Director General of Forest Utilization (DG PH) No. 131/1990, stated that the purpose of utilizing the forest among other is to produce timber, fibre wood, energy wood, or its combination including non wood product. In order to reach this purposes, every HPH should make a logging plan or forest plan. In that plan it should be state in detail the target volume the HPH would come.

Actually the mayority of HPH holders direct their endeavour to obtain the greatest income. In their forest plan, many HPH holders state that their forest utilization target is to get the highest income and profit and to accelerate forest conservation practise. Beside that, they

stated that the purpose of HPH Enterprise is to establish the Industrial Timber Estate (HTI), the development and utilization of other forest product as sago, rattan including the endeavour of guiding the economic weak group and cooperation in order to fulfill the government mission.

#### 2.1.6.2. The Task of HPH holder

In utilizing their forest, the HPH holder is obliged to obey several regulations and law. Basically the main rule should be followed is doing the Indonesian selective cutting and planting (TPTI) system. This system covers the activity as follow :

- a. Regulating the Working Area  
The regulating of working area is the activity of making borderline in the field using poles or other boundary signs at logging area.
- b. Inventory of trees before cutting :  
This activity cover the activities of registering, measuring and marking trees in a block which would be cut. The purpose of doing this is to count the diameter and the total timber volume and the trees should be protected if it should be so.
- c. The Transportation Network :  
This activity cover the activity connected with the road and bridge construction for timber transportation from cutting place to logyard (TPK).
- d. Logging :  
By logging it is means all activities of bringing timber from forest to the logyard.
- e. The Pruning  
Pruning is the activity of maintaining the living trees after logging to prevent the prime tree and other commercial species form disturbing. This is done by making proper space of the tree so the tree would grow healthily.
- f. Inventory of Logged Over Area (ITT)  
This activities should be done annually after logging and performs after pruning activity has finished.

- g. Seeding/nursery This is an activity covering the preparation and collection of seed, and making other infrastructure connecting with seed and nursery treatment.
- h. Planting  
At the beginning of rainy season two years after logging, the activity of planting should be done at the bareland or on the other suitable location.
- i. Maintaining  
The maintaining is an activity purposed to aid the growth of tree and be avoided from disturbance. It also has enough growing space.

Beside the activity to do the TPTI System, the HPH holder has several tasks according to Indonesian rule and regulation (IPB, 1982). The task which is considered sufficiently important named up to 48 items and could be grouped as follow :

- a. The task in planning field, covers 7 items consist several activities as the existence of aerial photo up to the obligation of making forest plan for the entire period (twenty years), five years forest plan and the annual plan.
- b. The task of performing timber production and manufacturing covers 22 items like building infrastructure production up to pay several fee connected to forest enterprise.
- c. The task on man power utilization concerning of 8 items starting from endeavoring the use of Indonesian man power up to prepare facilities for labour prosperity.
- d. The task on sustain yield principle covers 7 items connected with the endeavour of forest conservation.
- e. The task in the social development covering 3 items connected with the endeavour increasing the prosperity of rural people.
- f. Other task which could not be grouped into the above task covering the activities connected with the finance, administration, reseach and so on.

### 3. HPH Main Activity :

As the rule the activity of the HPH holder could be grouped into 3 kinds, i.e.

- (1) Logging activities, i.e. the activities connected with timber production.
- (2) Rehabilitation, protection and preservation of forest is the activities aim to rehabilitate logged over area and ing stock continueally and other safety activity so the area safe from disturbers and destroyers.
- (3) The activity of social development i.e. activities to increase the prosperity of the rural people around the forest through the village forest development program.  
Logging is the main activity of HPH entrepreneur. With this activity all timber in the forest could be transported out of the forest and bring to mill for daily usage. There are 3 stages in principle which need to be performed by HPH holder in the execution of logging, i.e. cutting stage, skidding stage and transportation stage, beside its planning stage.

#### 2.1.6.3 Social aspect of forest utilization

HPH holder has obligation to assist the local community around the forest. This community development task are :

- a. To carry on and develop of the community to perform permanent farming.
- b. Sustaining the indigenous people who live in the area.
- c. Assisting the local government in constructing religious building, hospitals, clinics, educational institution, communication network etc.

In practise HPH has assisted community by contributing or giving materials and money for several public facility constructions (clinics, mosques, offices, village hall, roads, etc.). Only in a small effort has given by HPH to assist the development of permanent agriculture or assist in rural economic development. The rural development activity is monitored by the Department of Forestry. The complete information on the HPH activity could be obtained from a report forwarded by HPH to the Director General PH as a realization on DG PH circular letter No. 391/IV-PHH/91 dated 21 February 1991.

In order to be more focused , the Forestry Department has developed a rural development program for village around the forest. This program can be seen from several decrees as follows :

- a). Technical guidance to build HPH Forest Village Development Unit (HPH-BDH), issued by the Director of Stability, DG RRL, This guidance (March 1990) consist of the regulation on the rural development done by HPH which at least has to guide and allocate 500 shifting cultivation family.

Each cultivator allocated to certain area of 1 - 2 ha.

Other than that, HPH has the obligation to construct sample unit HPH-BDH in the kind of farm business on an area of 1 - 2 ha managed by field functional officer of HPH and the permanent agriculture cadre (Kanitap).

By those arranging, this programme will be focused to assist on the development of shifting cultivator who live inside and outside HPH area by relying on the HPH holder own potential.

- b). Circulation Letter of DG PH no. 650/IV-OHH/1991 dated 1st April 1991, which consist of temporary guidance on arranging HPH- BDH working plan. This guidance cover the following items :

- The building of permanent farm outside the forest area among others is in the form of "sawah" (wet rice field) building, dam/irrigation construction, production factor assistance, extension etc.
- The husbandry technical assistance
- Preparing rattan seed, horticulture seed etc.
- Utilizing logging waste.

All above activities are performed by considering to :

- The potential and condition of the community
- Increasing the community prosperity and supporting sustainability of resources,
- The growing of rural economic sound environmental
- The growing of self supporting society.

c). Decree (SK) of Minister of Forestry No. 691/Kpts-II/91 dated 10 October 1991, stipulating the obligation of HPH holder in developing of the society inside and outside of the forest. That SK stipulate that :

- HPH holder is obligated to develop the community inside and around the HPH in order to increase the living standards of the society and the quality of forest resource increases too.
- The target of community development is to increase the income, the widening of job opportunity, the chance of endeavoring, and the growing rural economic sound environmental. Beside that, the target of those development is to reach the existence of the sufficiently economic infrastructure and to establish a positive behavior in increasing the self supporting forest establishment program.
- The activity performed covers the following aspects :
  - \* Permanent agriculture.
  - \* The increasing of economy.
  - \* The development of public structure and infrastructure and socio culture.
  - \* Preservation the forest resource sound environment.

The development target group are :

- The community inside the HPH area,
- The community at the HPH border
- The community in the village nearest to HPH,
- DG PH held the responsibility in guiding the HPH holder on HPH-BDH programme.
- DG RRL held the responsibility of the daily activity on HPH-BDH action.

d). Decree of DG PH no. 170/Kpts/IV-PHH/1992 on the Guidance to HPH holder on The Implementation of HPH Bina Desa Hutan issued on 23 January 1992

This decree is the guidance for HPH holders and regional forestry officer to plan, organize, implement and to guide the activity of HPH-BDH. By HPH-BDH according to this decree is all HPH holder effort to assist the increasing of community's

prosperity inside and around HPH which covers all activity as stated in the decree of Minister of Forestry no. 691/1992. With the existence of this decree the activity of HPH-BDH is performed by HPH holder and becomes a part of RKT, RKL and RKPH activities.

To arrange the above plan, the concerned HPH should performed diagnostic study in advanced.

e). The decree (SK) of DG RRL No. 14/Kpts/V/1992 on the Guidance of the Implementation of HPH activities on Forest Village Development issued on 17 March 1992. This SK state that the diagnostic study is the element for larranging the activities of HPH-BDH which could be done through the following patterns :

1. Agrarian pattern, covering the following aspects

- permanent agriculture;
- the sustaining the forest resource

2. Non agrarian pattern covering the following aspects

- economic approach,
- the infrastructural development

The permanent agriculture activity could be done in the form of dry land farm like agroforestry, the cultivation of industrial plantation, horticulture and other social forestry activity. Whereas the wet land farm took the form of rice field, pond etc. The non agraric activity to increase economic covering utilizing existance of manpower and the development of rural industry. In that degree stated too the process of planning, doing, monitoring, evaluating and reporting of HPH-DBH activity.

f). Degree of DG PH no.211/Kpts/TV/-PHH/92, on Technical Guidance on diagnostic study of HPH Forest Village Development (HPH-BDH) issued on 4th April 1992. This Degree state the guidance for diagnostic study planner as the basic of HPH-BDH master plan. The study item are utilizing forest aspect, biophysic aspects, socio economy aspect. Whereas the method use for studying the natural resource, human resource and socio economical local aspect is holistic system approach. For those

which are connected with the study of perception and aspiration of community uses the participation observation method.

The Degree shown that the government effort to increase the living standard of community just held in detail since 1990. The whole efforts concentrate to concession holder to develop rural community. It seem that the all activities does not stressed on the "commercial" aspect in HPH view. All the above activities needs professional manpower with sufficient dedication to increase the community life standard who live inside and outside forest.

#### 2.1.6.4. Environmental Impact Analysis.

##### 2.1.6.4.1. Environmental Impact Analysis (Andal).

The HPH holder who managed the forest for the purpose of production is obliged to make the Environmental Impact Analysis (Andal). By this Andal the concession holder is to be hoped could identify the activity plan which will produce important impact to environment. Besides that it is necessary, to identify the beginning environmental performance, especially those which will get the impact. Based on it then it could be estimated and evaluated the important impact against on environment and the impact of environment against forest utilization. Next, with those data and material one could arrange the management and monitoring of environments. With those activities, this andal study could be used to assist the decision making, planning and the management of the environment and the activity plan in the production forest.

The area used for andal study covering the administration boundary, ecological boundary and the artificial or naturally physically boundary. The environment aspect which should be examined, are :

- biogeophysics
- chemistry
- socio economy
- socio culture

#### 2.1.6.4.2. Planning of Forest Utilization

Design of the environmental impact analysis as mentioned above, requires a description on the planning of forest utilization and implementation of the forest utilization. In the planning of forest utilization, the first thing which need to be described is the need to utilize the production forest, viewed from the interest of the businessman and from the interest of supporting the development program. Afterwards, planning of activities is described and comprise the following :

- a). Activities related with forest regulation, boundary arrangement and forest classification and use of other land. All of these should show the relationship between the location of forest exploitation and the natural environment and the developed environment around the forest exploitation area. Several special sites such as nature reserve, wildlife reserve, natural protected area, cultural reserve, protection forest, water resources (spring) and other sensitive areas, which are located nearby the location, should be given special markings in the map.
- b). Description on location and availability of water, energy, natural biological and non biological resources and human resource which are needed in the implementation of forest utilization.
- c). Condition of facilities and infrastructure for forest utilization which comprise the condition of forest opening up facilities (road, bridge, compartment boundaries, etc) and other buildings such as base camp, log yard, log pond, office and residential building, workshop, etc which are designed for forest exploitation.
- d). Description on the components of forest utilization which are anticipated to produce significant environmental problems, which among other things comprise the following items :

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### Environmental problems due to forest utilization activity

1. Land sliding
  2. Unstability of slope and land
  3. Flood hazard
  4. Capacity of soil to absorb water
  5. Disappearing of vegetation cover
  6. Destruction and disturbance of habitat
  7. Disturbance toward animal migration
  8. Disturbance toward the health and welfare of the local people
  9. Gaps within the society
  10. Destruction toward sensitive place such as remnants of natural history, and remnants of cultural history
  11. Disturbance toward environmental capability and wasting of natural resources
  12. Disturbance toward the pattern of socio economic and socio cultural life of the people affected by the activity
  13. Environmental pollution.
- 

#### 2.1.6.4.3. Activity of Forest Concessionnaire

1. Forest survey and inventory
  - a. Techniques and methods of survey and inventory which has been conducted.
  - b. Activity for establishment of working area boundary, including activity regulating the area for traditional use by the local people.
2. Forest compartment and block
  - a. Implementation of forest laying out and construction of boundaries which are conducted
  - b. Activities for constructing boundaries of river, springs, and other protected objects
  - c. Activities for boundary maintenance
  - d. Activities for conserving protected flora and fauna

- e. Monitoring and early warning system of forest fire
  - f. Condition, size, number, construction and site selection procedure of log yard or other places for storage of products, including loading points.
3. Construction of office space and residential area
- a. Construction of office and residential complex, and facilities provided by those building and number of people/families served
  - b. Provision of sanitation, drinking water, handling of office and household waste and health facilities.
4. Road Building
- a. Land clearing which will be used for transportation road and construction for each class of road used, including construction for prevention of landslide.
  - b. Construction of bridge and other waterways (such as drain, culvert etc).
  - c. Taking of materials for road construction, bridges and other buildings, and efforts which are undertaken to overcome environmental problems which might occur in relation with such material taken and transportation.
5. Harvesting of forest product
- a. Gathering of forest product, forms of product produced, volume of quantity of taken, waste produced (including the danger and usefulness of the waste and handling techniques of the waste).
  - b. Transportation activities, including skidding and rafting and other movements, storage and preservation of products.
  - c. Prevention of habitat destruction and efforts to reduce waste occurrence.
  - d. Chemical substance used, handling techniques and safeguarding measures
6. Post harvest handling
- a. Post harvest inventory activity
  - b. Activity in regeneration, maintenance and safeguarding of logged over area.
  - c. Rehabilitation of unproductive area and other less vegetated area

- d. Utilization of chemical substance (fertilize, herbicide, fungicide, insecticide, etc) and techniques of safety handling and storage of those chemicals (including the handling of excess materials).

#### 2.1.6.5. Guideline of ITTO

In relation with the managing of production forest, it is importance to consider the ITTO guideline which include the principles for sustainable management of tropical forest. The outline of those principles is as follows :

##### Policy and legislation

##### a. Forest policy

1. Existance of strong commitment of national politics
2. Availability of appropriate policy and regulation
3. Availability of mechanism for improving the policy

##### b. National forest inventory

4. Inventory should determine the primary function of all forest area
5. Provisions on forest inventory should be flexible

##### c. Fixed forest area

6. Fixed forest area should be safeguarded
7. Fixed forest area consist of area for protection, nature conservation, production of timber and other forest products, and area which is set aside for achieving the combined objectives mentioned above
8. Area which can be converted should remain to be managed as in other forest area, until its function status is decided clearly.

## Forest Management

Forest area which has been set aside for timber production should also be able to achieve the objective of protecting the environment and conserving species and ecosystem. The achievement of multiple benefits is pursued by applying environmental standards manifested in each operational activity.

### a. Planning

1. Stable dynamic forest inventory. Forest area for timber production should be inventoried in more detail.
2. Establishment of management objective  
Objective of the management is established rationally for each management unit. The size of each management unit should be a function of cutting cycle, average volume of harvest per ha and target of annual yield of harvest of the forest.
3. Choice of silviculture system  
Selection of silviculture system is based on sustainability of yield.
4. Annual Allowable Cut  
There is a need for a reliable method for regulating timber yield.
5. Management of inventory activity and mapping.  
Inventory activity is supported by mapping activity.
6. Preparation of working plan.  
Working plan should be concerned with environmental conservation.
7. Evaluation of Environmental Impact  
Environmental impact assessment should be conducted before operation.

### b. Harvesting

Harvesting activity should be in line with the silviculture system used.

1. Inventory before cutting (logging)  
Inventory should be carried out before cutting.
2. Transportation road  
Development of forest opening up should reduce the environmental destruction.
3. Logging  
Logging activity should be properly regulated
4. Management of stand after logging  
Management of residual stand is highly needed.

c. Protection

1. Supervision

Supervise the activities which can disturb the sustainability of timber production.

2. Forest Fire

Conduct fire prevention more intensive protection measures.

3. Chemicals

Be careful in handling chemicals.

d. Arrangement of regulation

1. Concession agreement

Incentive is needed to support sustainable forest management.

2. Exploitation permit for community forest

The fundamental principle of sustainability for community forest is the same with that for state owned forest.

3. Optimum utilization permit Wood product obtained from converted forest and damaged forest, should be utilized optimally.

e. Monitoring and Research

Monitoring and research activity should be able to provide feedback on the correctness of forest management implementation, with the objective of ensuring sustainability of production and other benefits from the forest.

Aspect of socio economics ana finance

Sustainability of wood production depends on the sustainability of incentive distribution, cost and profits caused by forest management activity, for the main agents of this activity, namely government, concessionnaire and local people.

a. Relationship with local people should be harmonious

b. Economy, incentive and taxation

Management of production forest should be economical. A part of its financial profit should be used for maintaining sustainability of forest resource productivity. Retribution and taxation from the forest should be regarded as stimulant for more rational and efficient

forest utilization, development of efficient processing industry and prevention of marginal utilization of wood products.

#### 2.1.6.6. Forestry Minister Decree no 252/93

In his decree number 252/Kpts-II/93 dated 29 April 1993, forestry minister has established criteria and indicators for sustainable management of Indonesian Natural Production Forest. The criteria for sustainable management of natural production forest are as follows :

- a. Aspect of natural resources
- b. Aspect of yield sustainability
- c. Aspect of conservation
- d. Aspect of socio culture
- e. Aspect of institution.

Indicator for each aspect is applied for each forest management unit. These indicators are described completely as follows :

##### 1. Indicator of natural resources aspect, consist of :

- a. Forest area which has been formally established and/or has been decided as forest area.
- b. The forest has been inventoried.
- c. Species diversity in the forest area is guaranteed to be represented.

##### 2. Indicator of yield sustainability aspect

- a. Historical records/history of forest management is documented properly
- b. Fixing of rotation (cycle) and annual allowable cut, in line with forest potency
- c. Selection of silviculture system in accordance with the forest type
- d. Regulation of target and production utilization has been determined in accordance with forest resource variability.

3. Indicator of conservation aspect

- a. Conservation area has been established within the area of natural production forest
- b. Management of conservation area within natural production forest
- c. Environmental impact analysis (ANDAL) is conducted in line with the provisions
- d. Protection and safeguarding of forest is conducted intensively and continually.

4. Indicator of socio economic aspect :

- a. Employment opportunity
- b. Business opportunity
- c. Welfare improvement within and around the forest
- d. Increase of national income

5. Indicator of institutional aspect

- a. National forest policy has been established with law and legislation
- b. Organization which ensure the implementation of national forest policy, in the central and provincial level, is established
- c. Forestry planning has been established for long term, moderate term, and short term period for national level and provincial (reional) level.
- d. Formation of control institution in accordance with necessity
- e. The carrying out of research to support all aspects described in items (1), (2), (3), (4) and (5) as mentioned above.

2.1.6.7. The Sample of HPH Annual Report 1991/92.

In the 1991/92 PT SBK reported the activities covering the following aspects :

1. Aspect of sustainability.

1.1. Planning

a. Aerial photo, interpretation and relief map

1.1. Aerial photo was done by PT Alur Matta Consult.

PT SBK also has a Landsat photo

- 1.2. The photo interpretation map of standing stock has been finished but not despatched yet to department
- 1.3. Topographic map has been finished but not approved yet by the department

b. Forest Regulation

- 2.1. Border lines map has been finish partly
- 2.2. The blocks boundaried or cutting blocks is made in commensincing broad 1,5 meters
- 2.3. Working plan map has approved by Directorate Forest Inventory and Planning (Ditjen Intag) and head of Forestry Regional Office
- 2.4. Cruising has been done with attaching the tree distribution map

c. Working plan of the Forest Explotation

- 3.1. RKPH is not approved yet
- 3.2. RKL of the current year has already been recommended by the head of the Regional Office
- 3.3. RKT of cuurent year has been approved already

- 1.2. The Implementation of Management  
There is no contract management with other company.

1.3. Forest Establisment

- 1.3.1. The accomplishment of TPTI (Indonesian Selective Cutting and Planting)

a. Liberation

- 1.1. The creation of lines, cleaning the area, girdling poisoning of trees untill this year has been done 23.550 hectares
- 1.2. Registering of trees which are freed and disturber species which has been killed

b. Inventory of residual stand (ITT)

- 2.1. ITT up to this year has been excuted 23.550 ha

2.2. The processing of LHC (Cruising Report) data about the residual stand and prime tree distribution map has been done and up to this year has covered about 236 ha

c. Nursery

3.1. Until this year has been produce 1,9 millions seedling by pulling the natural seedlings and seeds

d. Enrichment Planting

4.1. Until this year it has been planted 490 000 seed-lings

e. Maintenance 1

5.1. The weed cleaning has been done until this year are 7 000 ha. on cutting block 1988/89

5.2. Replacing the dead plant has been not done yet

f. Further Maintenance

6.1. Pruning the disturbing trees, thinning and girdling are done at cutting block 1984/85 which up till this year has reached an area of 4.250 ha.

1.3.2. Industrial Timber Estate (HTI)

a. Plan for 3.300 ha. for HTI Transmigration has not executed yet

b. Non wood utilization is not done yet

1.4. Forest Protection

a. Preventing forest from disturbance using 10 persons of special safeguard (satpam qualification)

b. Germ conservation is being executed by preparing animal refuge area

c. Prevent against fire is done by making prohibition sign and extension

d. Controlling disease and entomology using herbicide, pesticide and doing extension

e. Protection of flora and fauna is executed by making animal refuge area

- f. Protection of water resource, river and lake are performed with prohibition sign and extension
- 2. Utilization aspect
  - 2.1. Production
    - 2.1.1. Until now cumulative cutting block (which is reported since 1980/81) has reached an area of 37.000 ha. The average cutting block are between 3.000 - 4.300 ha. approximately.
    - 2.1.2. No IPK cutting
  - 2.2. Production Infrastructure
    - The construction of haulig road till now reached 188 km. of main road and 270 km. branch road which has been measured and mapped and reported to the Dirjen PH.
  - 2.3. The equipment used for forest utilization covers heavy equipment and light equipment for trasporting logs.
  - 2.4. Log accounting uses legal documents and already approved by forestry instance.
  - 2.5. The existing industry are plywood, moulding and saw mill with a total capacity 146.000 m3.
- 3. Manpower Aspects.
  - 3.1. Technical manpower of forestry was used cummulatively increasing in last 3 years
  - 3.2. Prosperity.
    - a. Prosperity infrastructure was exist are housing. religious facility, health facility, cooperative development plan
    - b. Enterprise regulation and working agreement are in the form of agreement on working approval.
    - c. The development of worker is being performed by sending worker to the training place.

#### 4. Social Aspect.

##### 4.1. Facility assistance.

- a. The construction of sample plot for managing shifting cultivation is made up to 1 ha, on dry land 7 ha, on wet land 0,16 ha and in mixed 0,40 ha.
- b. The management of socio cultural in the form of several kind of donation such as for mosque, health center, teacher and text books for school.
- c. Assistance for economic increasing in the form of permanent cultivation 4,25 ha, wet land 7 ha and dry land 15 ha.
- d. The development of infrastructure such as 8 km road construction, 5 units football course and police boarding and housing.
- e. The extension is performed continuously.

##### 4.2. Community development.

- a. It has been performed that using local people with total number of 351 daily free.
- b. It has been executed skill training, extension and the guiding of shifting cultivator.

##### 4.3. General condition of the area.

It can be reported that there are shifting cultivation in the production forest with total area 200 ha and community housing up to 150 ha.

##### 4.4. Company profit.

It can be reported that profit after tax amounting to Rp.10,6 billion with current activa about Rp.34,2 billion and current of Rp.33,2 billion

## 2.2. Condition of Human Resources in Forestry

If considered in more detail, it appears that Broadline of National Policy (GBHN) 1993, explain that forestry activity is implemented not only by forestry ministry, but also by many other institutions such as institution as public works, transmigration, provincial government, tourism, cooperative, trade, etc. However, in fact, the greatestt number of personnels which handle forestry activity are those under Forestry Ministry. Because of this, analysis of human resources in forestry and environment will be emphasized in Forestry Ministry (including its vertical hierarchy working units), forest concession unit and wood industry.

Until June 1992, the number of personnel under the Forestry Ministry, reached 36 260 people which consist of civil servants (including condidate of civil servants), and non regular (not permanently employed) workers. The complete data on worker distribution is presented in Table 1.

Table 1. Number of personnel, working in Forestry Ministry

Working Unit	Total	
	people	percentage
A. Central Office		
1. Secretariat General	813	2.42
2. Inspectorate General	153	0.42
3. DG of Forest Utilization	387	1.06
4. DG of Land Rehabilitation and Reforestration	440	1.21
5. DG of Nature Conservation and Forest Protection	567	1.56
6. DG of Forest Inventory and Land Use Planning	440	1.21
7. Agency for R and D	728	2.00
8. Centre for Educ. and Train.	194	0.53

B. Provincial Office	2 162	5.96
C. Technical Executive Unit	14 646	40.39
D. Outside Employment at :		
1. Forestry service	4 772	13.16
2. State Owned Enterprise	8 489	23.41
<hr/> Total	<hr/> 36 260	<hr/> 100

Table 1 shows that the greatest number of personnel are those under the Technical Executive Units, which comprise almost 41 % from the total existing forestry personnel.

If it is examined further it appears that more than 13 % of the worker is non regular (not permanently employed) in their status. Those who are official civil servant or will be promoted to be official civil servants are only about 87 %.

According to Personnel Bureau of Forestry Ministry, as quoted by sub team A consultant, until January 1993, the number of personnel who holds graduated and post graduate (Master and Doctor) degree in Department of Forestry, reach 3 724 people, namely :

1. Doctor	25 people
2. Master	184 people
3. Sarjana (graduate degree)	
Forester	2 303 people
Non Forester	1 212 people
<hr/> Total	<hr/> 3 724 people

From the available data, it appears that the ratio between professional workers and technician is 1 : 1. In fact, according to FAO consideration (1991) the suitable ratio between professionals and technicians, range between 1 : 4 and 1 : 5. Specific information on Forestry Ministry personnel who have finished post graduate study program, can be seen in appendix 1 at the back side.

Based on its type, there are three types of official position in Ministry of Forestry, namely : (a) structural position, (b) functional position and (c) non structural position. Number and composition of these position are as follows :

a. Structural Officer		5 845
1. Echelon I	13	
2. Echelon II	105	
3. Echelon III	483	
4. Echelon IV	3 908	
5. Echelon V	1 336	
b. Functional Officer		4 451
c. Non Structural Officer		21 195

If it is examined more detail, the functional officer are employed in secretariate general (30 people) in Agency of Research and Development (117 people), in Education and Training (32 people) and in Technical Executive Unit (4272 people). Specific information on functional officer up to June 1992, is as follows :

1. Instructors	89	people
2. Researcher	266	people
3. Teacher	21	people
4. Forestry Extension Officer	3 240	people
5. Forest guard	705	people
6. Archivist	30	people

What is mean by functional positions, are those positions which are formed to accomodate career development of personnel employed on specific duties, through evaluation of achievement credit score.

At present, there has been develop of functional position in forestry which comprise functional officer in computer and forestry technician. Functional position of forestry technician which has been validated, comprise the following :

1. Forest mensuration specialist
2. Forest inventory specialist

3. Forest exploitation supervisor
4. Supervisor of forest product grading
5. Reforestation specialis
6. Soil Conservvation specialist
7. Conservation of forest area and environment specialist
8. Cultivation of non timber species specialist
9. Conservation of biological natural resources specialist
10. Development of outdoor recreation specialist

This functional officer can be recruited from rank II/a through rank IV/c.

Mean while, according to the estimate of FAO (1991), the number of personnel in forestry sector until 1989 reached 248445 people. This number does not include non regular worker, contract worker and workers who are employed in non forest concession companny, workers in small industry and independent workers who collect forest product independently. The number of workers classified based on education and working place, can be seen in the following table (Table 2) :

Table 2. Classification of forestry sector worker, based on education level

Education level	Government		Private		Total	
	People	%	People	%	People	%
Sarjana	4 190	8.9	804	0.4	4 994	2.0
Bachelor	1 961	4.2	1 339	0.7	3 300	1.3
Senior High School	23 627	50.2	58 726	29.2	82 353	33.1
Yunior High School	6 651	14.1	58 097	28.8	64 748	26.1
Elementary School	10 633	22.6	82 417	40.9	93 050	37.5
<b>Total</b>	<b>47 062</b>	<b>100</b>	<b>201 383</b>	<b>100</b>	<b>284 445</b>	<b>100</b>

From the recorded number of sarjana, only 70 % of it are forester. Nearly 30 % of sarjana are non forester who come from other scientific discipline.

Distribution of personnels who hold sarjana (graduate) and post graduate (Master and Doctor) degree, which afterwards is called professionals in forestry sector, can be seen in Table 3.

Table 3. Distribution of personal workers according to their working place

Working place	Number of professionals (people)
1. Expert staff of minister	6
2. Secretariate General	297
3. Inspectorate General	67
4. DG of Forest Utilization	167
5. DG Land Rehabilitation and Reforestation	143
6. DG of Nature Conservation and Forest Protection	210
7. DG Forest Inventory and Land Use	77
8. Agency of R and D	185
<hr/>	
Total number in Central Office	1 152
<hr/>	
9. Provincial Office	634
10. Provincial Forestry Service	839
11. Agency for Forestry Training	94
12. Agency for Information and Certification of Forest Products	75
13. Agency for Land Rehabilitation and Soil Conservation	392
14. Agency for Natural Resource Conservation/ National Parks	243
15. Agency for Forest Mapping and information	144

16.	Agency for Forestry research	50
Total number in provincial/regional office		2 471
17.	State Owned Forestry Company	400
18.	Inhutani, LAD Co, I, II, III	147
19.	Others	20
Total number in State Owned Business unit		567
20.	Forest Concession Holder	468
21.	Sawmilling Industry	100
22.	Panel Industry	236
Total number in privat sector		804
Total number		4 994

The total number of professionals in state owned business unit, reached 567 people. If it is examined further, it appears that those personnels comprise sarjana of forestry as many as 330 people (58 %), whereas the rest comprise sarjana personnels from various disciplines of non forestry.

The number of personnel with sarjana qualification in private wood company, reached 804 people. Beside that, it is recorded also that there are foreign worker (assistance worker) employed in those company, which number up to 3000 people (up to the year 1989). Half of those assistance workers are professional workers. These foreign personnel, work in logging (40 %), whereas the other, work in industry. Up to the year 1991, the number of foreign worker was progressively decreasing until it reached 583 people (FAO 1991).

If it is examined further, it appears that professionals who work in logging comprise 468 people, in sawmilling 100 people whereas in panel industry 236 people.

If comparison is made between the number of professionals and the area of production forest which is under his responsibility, it appears that each forestry personnel is

responsible for more than 30 000 ha. In term of production unit, this means that each professional produce 229000 m3 of round wood. In the field of industry, each professional produce 329000 m3 sawnwood and 83000 m3 panelwood.

Because most forestry activity are in the field or in the region, then the number of professionals should be more positioned in the regions and in the private companies. This ideal condition, at present, has not been achieved. According to FAO (1991), the needs for professionals up to the year 2 000 are as follows :

Table 4. Estimate of the needs of professionals up to the year 2000

Year	Government	Private	Total
1991	4 194	804	4 994
2000	5 750	6 724	12 474

The above estimate shows that professionals will be absorbed much more in private companies than which will be employed in government institutions. Lack of professionals in the next 10 years, is estimated to reach 8000 people.

### 2.3. Activity of Human Resource Development

#### 2.3.1. Development and improvement of human resources

One obstacles faced in the management and development of human resources, is lack of accuracy in the available database. This drawback has been felt for a long time. In the year 1986, data base 'on personnel affairs has been developed as one unit in the forestry information system (Ministry of Forestry 1993). The development of personnel database was conducted by using mini computer HP 3000 which was continued further with recording of personnel biodata. Afterwards, there was no further continuation.

In the year 1989, Bureau of Personnel Affairs developed personnel database. by using personal computer (PC). The assembled data were different with the previous data. Afterwards, biodata was also collected and recorded. Further action has also not been clear yet.

Once more in the year 1991, Bureau of Personnel affairs renew the recording of personnel biodata. Further measures for this activity has not been clear yet, up to now.

### 2.3.2. The needs of post graduate educated personnels

Centre for Education and Training, Ministry of Forestry, which cooperate with PT. Hobase Delta Harmony (HDH), has compiled a study on analysis of the needs and arrangement of long term plan of S2/S3 education. This study was intended to anticipate the second long term development (PJPT II) of forestry sector. Those personnels are expected to be able to maintain the forestry sector contribution toward national development, to shape Indonesia as one country with mega biodiversity, and to make Indonesia as study centre of tropical forest in the world. This study identified the needs for personnels with S2 and S3 qualification at various specialization, either in forestry sciences or other supporting sciences.

To determine the needed number of personnel with S2/S3 qualification, and their specialization in forestry ministry circles, several fundamental things should be conducted such as macro planning of personnel, appropriate and standard job analysis, and analysis and working load. At present, those fundamental things have not been available, and hence, study on the needs of S2/S3 educated personnel in forestry ministry circle, was more anticipative in its feature, to face future condition.

To eliminate any possible error in the determination of needed personnel with those education qualification, PT. HDH, in the prepared report for MOF (1993) takes several assumption as follows :

- a. The needs of S2/S3 personnel which will be calculated, refer to function differentiation which constitute a further manifestation of the MOF mission. The approach of this function is conducted in order not to be dependent rigidly on the present organization structure. However, organization structure remains to be used as something to be

considered, especially in terms of estimation of working load. This is conducted, in consideration that this study is long term in its features, so that it should be able to anticipate long term needs.

- b. The needs of S2 and S3 personnel which will be calculated, also refer to differentiation of authority in each function. From this phenomena, there is an impression that in the implementation of those functions, there is a significant differences in term of the role played by organization unit in central office, provincial office, technical executive unit and forestry service. Although this function differentiation is anticipated to undergo shifts in line with decentralization issue which increasingly develop recently, up to now however, there has been no any clear formulation concerning the desired form of decentralization. Beside that, those shifts are anticipated in the future, to increase the need of S2/S3 personnels.
- c. The needs of S2 and S3 personnel will be calculated and analyzed based on minimal number which should be available for each unit, which reflect distribution of authority, and are not based on the needs at a certain type of position. This is conducted because in the job analysis, there is no any position which require qualification of S2 or S3 degree. Therefore, identification of the needs of S2 and S3 for a certain unit, is based on an idea, that to perform its function properly, a certain organization unit should be supported by S2 or S3 personnels in a minimum number, but can perform maximally in line with their qualification and specialization. without considering the most appropriate position for them.
- d. The needs of S2/S3 personnel which will be calculated is a minimum needs, which means that by considering the manifestation of function and differentiation of authority for implementation of that function, then with the predetermined number of personnel, the implementation of that function of that function can run appropriately.
- e. Personnel who holds the S3 (PhD) qualification, is a personnel who has the highest academic capability and skill for a certain field of study and is categorized as innovator. Based on their level of qualification, the most suitable role for them who holds this S3 qualification, is as researcher. Personnel which holds the S2 (Master) qualification is that who has academic ability one level below S3 in a certain field of study and is categorized as analyst/formulator. Personnel with this academic qualification is assumed to be able to bridge between innovation produced by S3

personnel and the practical needs in the field in the form of policy package or implementation formulation of that policy. Based on those formulation and assumption, a plan of minimum needs of various expertise and level of qualification can be projected to anticipate the need of personnels with S2 and S3 qualification. Projection of needs is conducted in analytic qualitative manner, and step by step for each function. Afterwards, with similar method, a recalculation is conducted between functions by considering the minimum needs for each unit.

In general, the process of calculation or projections of the needs for S2 and S3 personnels is as follows :

- a. Firstly, function differentiation possessed by MOF is described. Based on that function, specialization or expertises needed to implement and support those function will be identified.
- b. After each expertise for each function is identified, the next stage in the description of authority differentiation in the implementation of those function, which is based on :
  1. Central office, which consist of :
    - a. Technical affairs
    - b. Research
    - c. Training
  2. Regional office
  3. Forestry service, which consist of :
    - a. Provincial forestry service
    - b. Branch of provincial forestry service
    - c. Agency/National Park
    - d. Sub Agency
    - e. Research unit/Agency of Forestry Research
    - f. Training unit/Agency of Forestry Training
    - g. Education unit/Senior High School of Forestry.

- c. Based on manifestation of each function (horizontal differentiation) and distribution of authority in the implementation of function (vertical differentiation) and the existing organization structure (estimation of working load), then the needs of various expertise and qualification can be determined for each function.
- d. Afterwards, figure obtained from point c, is analyzed again by subtracting the need of similar expertise for different function (squeezing) which is supposed as still being able to be covered by the same personnel to acquire the minimum number.

Based on the steps described above, the results can be seen in appendix.

## CHAPTER III REQUIRED PROFESSIONAL WORKER

### 3.1. Man Power Identification

Professionalism is one's quality in doing his job related to his profession or work. According to Webster's dictionary, profession is a job or position requiring further education in a certain field of knowledge. For this job, it is needed more mentally (thought) than physically (manually). So professionalism is one who has further education and doing his job relied on his mentally or thought.

According to Society of American Forester, technician is one who responsible on a position in between professional worker and skilled worker. In compare to skilled worker, technician has more theory but specifically his knowledge is lower than professional worker (Abidin, 1984). The most important thing for technician is his practical knowledge. It is not necessary for him to know knowledge deeply on the certain activity as professional does.

Tarumingkeng (1990) wrote that etics of professionalism is dedicated, honest and strong. Further, Tarumingkeng stated that professionalism in complicated tropical forest management is long lasting process. Dynamics development in forestry professionalism requires comprehensive knowledge on system of forestry as natural resources and also it is a pillar for many kind habitats in the shape of ecosystem. The duty of forester is to maintain stabilization of forestry system by using science and technology which develop continually in accordance with period development.

Further, Tarumingkeng stated that the process of professionalism development of forest management is intergrated with development processes of organization and institution of forestry, industry, society, science and technology. Thus, today's and future needed professional worker is depend on our capability to assume the future problems and activities based on today activity to maintain our Indonesia forest.

In the former chapter, it has stated that in the future there are four main activities which should be carried out with five supported activities that is

1. Mayor Actions
  - a. Ekosystem protection
  - b. rehabilitation of critical forest land
  - c. increase social participation
  - d. Forestry entrepreneur and diversification of forest products development
  
2. Supported actions
  - a. Extension
  - b. education and training
  - c. Rules and regulations
  - d. information access e. research and development

Further, it should have paid attention on 16 strategics problems, that is :

- a. Preparation of precondition in forest management
- b. Improvement of Forest Resources Productivity
- c. Market Development
- d. International Issues
- e. Control of Forest Resources and the Environment
- f. Rehabilitation of critical land, especially those located in water catchment areas
- g. Conservation of natural resources
- h. Development of science and technology
- i. Diversification of forest products and services
- j. Forest exploitation by forest concession owner
- k. Development of industrial plantation (HTI)
- l. Control of shifting cultivation
- m. Development of human resources quality
- n. Institutions
- o. Rules and Regulation
- p. Control/supervision

By paying attention to the main and support activities and considering those 16 strategic problems, so one can arrange the necessary program according to forest Repelita VI concept. These program could be classified into the following 29 activities :

1. To accelerate the implementation of forest/natural resources inventory
2. To establish fixed forest areas
3. To accelerate the establishment of forest boundaries
4. To make and provide maps
5. To develop the resource management in production forest
6. To develop production of timber and non wood products
7. To improve management of forests as an ecosystem
8. To maintain natural forest productivity
9. To improve professionalism in forest entrepreneur
10. To optimalize function of institution in the development of forest entrepreneur
11. To increase social participation
12. To improve maintenance and protection of biodiversity
13. To improve and carry on the restoration and reforestation, especially in critical forest land
14. To continue and improve soil conservation and the greening/ plantation program outside the forest area
15. To continue the development of community forest
16. To continue the development of community forest system
17. To increase productivity of industrial plantation and to control/stop illegal forest cutting
18. To improve control of shifting cultivation
19. To improve the development of protected area management (including national parks, marine parks, recreation forest, hunting parks, etc)
20. To increase the role of research centers and accelerate the application of efficient and effective technology
21. To improve the quality and quantity of researchers
22. To encourage cooperative researches
23. To develop agency for regional research and development (UPT)
24. To increase the quality of human resources
25. To improve education, training and forestry extension
26. To draw up rules and regulation and to complete the existing ones
27. To improve the quality of control in forestry development

- 28. To conduct international network on forestry development
- 29. To increase the quality of officials.

By taking into account forest activities which should implemented as mentioned above, it is stipulated the form of man power needed for the execution the above mentioned activity. The man power needed are as follows

Professional Man Power for the following activities.

### 1. Inventory of Natural Forest Resource

System Analysis	Soil science
Forest Biometric	Wood measuring science
Forest Biology	Wild life Inventory
Dendrology	Computer
Aquatic and marine ecology	Forest soil microbiology
Geodesy and cartography	remote sensing
Habitat Forest	pathology/disease
Forest hydrology	Statistic

Professional Man Power or the following activities.

### 2. Establishment the Fixed Forest Area

Agro forestry	Forest biometric
Water and marine ecology	Habitat
Public relation	Law
Human Relation	Common law
Environmental science	Forest Policy
Social forestry	Computer
Watershed management	Transportation network & forest engineering
Remote sensing	Forest valuation
Forest planning	Resource Planning
Regional planning	Rural sosiology

Professional Man Power for the following activities

### 3. Establishment boundaries

Geodesy and cartography

Human relations

Laws

Common laws

Forest engineering

Remote sensing

Forestry extension

Forest planning

Professional Man Power for the following activities

### 4. Mapping

Office administration

Geodesy and cartography

Filling

Computer

Surveying

Professional Man Power for the following activities

### 5. Management of the Forest Production

Office administration	Strategic management
Agro business management	Forest machineries
Agroforestry	Research operation
Accounting and cost	Logging
Analysis System	Forest by product
Environmental impact analysis	Marketing
Biotechnology	Forest engineering
Business administration	Tree Improvement
Natural resource economy	Forest Regulation
Habitat	Habitat management
Forest pathology	Quality control
International recreation	Forest valuation
Public relation	Forest extension
Human relation	Forest economic
Laws	Work Shop and Machine
Common laws	Forest planning
Work science and ergonomy	Resources planning
Environment science	Forest protection
Filing	Library
Forest Policy	Agriculture
Sosial Forestry	Husbandry
Computer	Fishery
Communication	Sylviculture
Soil and water conservation	Management Information System
Business management	Statistic
Warehouse and stock management	Seed technology
Human resource management	Rural sosiology

Professional Man Power for the following activities

## 6. Development of Timber and Non Wood Production

Environmental impact analysis	Biotechnology
Business administration	Natural resource economy
Forest product entomology	Wood science
Work science and ergonomy	Environmental science
Wood chemistry	Computer
Warehouse management Industrial	Forest management
Forest machinaries	Research operation
Wood panel	Wood preservation
Quality controll	Sawmilling
Wood working	Forest recreation
Pulp and paper	Wood technology
Industrial technology	

Professional Man Power for the following activities

## 7. Protection Forest Management

Agroforestry	Analysis System
Environmental impact analysis	Natural resource economy
Forest hydrology	Environmental science
Soil and water conservation	Human resource management
Forest Engineering	Forest Regulation
Habitat management	Animal management
Forestry extension	Resource planning
Regional planning	Forest planning
Rural sociology.	

Professional Man Power for the following activities

**8. Maintaining Natural Forest Productivity**  
(TPTI application and Newable Resource Development)

Agribusiness management	Analysis system
Forest biometric	Biotechnology
Forest biology	Natural resource economy
Habitat	Forest hydrology
Climatology	Environmental science
Soil science	Production/operation management
Strategic management	Forest soil microbiology
Logging	Harvesting forest by prod
Marketing	Forest Engineering
tree Improvement	Forest planning
Forest valuation	Forest extension
Forest protection	Sylviculture
Management Information system	Social forestry

Professional Man Power for the following activities

**9. The Improvement of the Professionalism on Forest Enterprenur**  
(Guiding and Raising the Enterprise Controlling).

International relation  
Human relation  
Public relation  
Environmental science  
Forest policy and Forest Politic  
Social marketing  
Natural resource planning  
Management Information system

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Professional Man Power for the following activities

### 10. Raising the Role of Forestry Institution

(To Implement regulation, service, policy study, technology implement, the development of forest concession system).

State administration	Natural resource economy	International relation
Human relation	Public relation	
Laws	Common law	
Agrarian laws	Forest laws	
Trade law	Corporate law	
Forest policy	Communication	
Social marketing	Forestry extension	
Management Information system		

Professional Man Power for the following activities

### 11. Increase Social Participation

Agribusiness management	Honey hatchery
Forest protection	Natural silk
Agriculture	Husbandry
Fishery	Social psychology
Forest recreation	Social forestry
Sociology	Rural sociology
Agroforestry	Biotechnology
Business administration	Natural resource economy
Human relation	Common law
Agrarian law	Communication
Production/operation management	Strategic management
Social marketing	Forest protection

Professional manpower for the following activities

## 12. Maintenance and Protection of Biodiversity

Environmental impact analysis	Riset operation
Marine biology	Interpretation
Forest biometric	Social marketing
Biotechnology	Forest road
Forest biology	Tree Improvement
Dendrology	Plant breeding
Aquatic and marine ecology	Animal breeding
Resource economic	Tree physiology
Forest management	Habitat
Education	Forest hydrology
Habitat management	International relation
Wild life management	Public relation
Remote sensing	Human Relation
Forest law	Laws Forest
valuation	Common laws
Forestry extension	Agrarian laws
Forest planning	Climatology
Regional planning	Environmental science
Animal behaviour	Soil science
Forest protection	Wild life inventory
Statistic	Filing Forest policy
Computer	Soil and water conservation
Watershead Management	Resource management
Forest soil microbiology	Oceanology

Professional manpower for the following activities

**13. The rehabilitation and the reboisation  
of forest/land critic**

Agribusiness management	Watershead management
Agroforestry	Forest management
Biotechnology	Resource management
Forest biology	Forest soil microbiology
Dendrology	Social marketing
Forest physiology	Forest engineering
Geology and geomorphology	Seed Technology
Forest entomology	Tree breeding
Forest hidrology	Forest valuation
Public relation	Habitat management
Human Relation Statistic Common laws	Remote sensing
Agrarian laws	Soil Science
Climatology	Forest pathology
Social Forestry	Regional planning
Computer	Forest protection
Communication	Rural sociology
Soil and water conservation	Silviculture
Financial management	Production/operation management

Professional manpower for the following activities.

#### 14. Greening movement and soil conservation

Agribusiness management	Watershead management
Agroforestry	Human resource management
Biotechnology	Marketing
Resource economic	Social marketing
Tree physiology	Tree improvement
Human relation	Habitat management
Public relation	Forestry extension
Laws	Regional planning
Common laws	Agriculture
Agrarian laws	Husbandry
Climatology	Fishery
Environmental science	Social psychology
Soil science	Rural sociology
Social Forestry	Statistic
Communication	Seed technology
Soil and water ccnservation	Financial management
Marketing management	Stategic management
Production/operatin management	

Professional Manpower for the following activities.

### 15. Community Forest Development

Agribusiness management	Agroforestry
Accounting and cost	Dendrology
Resource economy	Tree physiology
Forest product entomology	Forest Disease
Wood science	Soil science
Soil and water conservation	Cooperation
Business management	Financial management
Marketing management	Strategic management
Production/Operation management	Watershed management
stock inventory	Forestry management
Human resource management	Forestry machinaries
Quality controll	Wood drying
Wood working	Sawmilling
Forest extension	Regional planning
Sylviculture	Seed technology
Wood technology	

Professional Manpower for the following activities.

### 16. Social Forest Development

Agrobusiness Management	Agroforestry
Accounting and cost	Biotechnology
Business Administration	Society relation
Public relation	Laws
Human Relation	
Common laws	Agrarian laws
Trade laws	Corporate laws
Forest laws	Soil science
Social forestry	Cooperation
Business Management	International Management
financial management	Industrial Technology
Production/operation Management	Strategic Management
Watershed Management	Human resource Management
Non Wood Harvesting	Marketing
Social Marketing	Quality control
Forestry extension	Resource Planning
Forest Protection	Honey Bee
Regional planning	Library
Natural Silk	Agriculture
Husbandry	Fishery
Social Phsycology	Sosiology
Rural sociology	Statistic
Seed technolohy	Wood technology

Professional manpower for the following activities

**17. Increasing industrial timber estate and  
managing the shifting cultivation**

Accounting and cost	Stock inventory
Environmental	Impact Analysis
Business Administration	Human resource Management
Public Relation	Marketing
Laws Forest	Engineering
Forest laws	Tree Improvement
Soil science	Quality control
Cooperation	Sawmilling
Business Management	Remote sensing
International Management	Forest valuation
Production/operation Management	Operation Research
Strategic Management	Forest Planning
Forest Management	
Forest Biometric	Forest Industrial
Forest Biology	Forest soil microbiology
Dendrology	Non wood harvesting
Tree Psychology	Logging
Habitat	Wood preservation
Forest Product entomology	Habitat management
Forest Entomology	Wood Drying
Climatology	Fire control
Wood science	Wood Working
Wood science and ergonomics	Forest Pathology
Environmental Science	Forestry extension
Computer	Forestry Machineries
Communication	Rural sociology
Regional planning	Seed Technology
Forest Protection	Industrial Technology
Pulp and Paper	Wood Technology
Silviculture Management	Information Sys

Professional manpower of the following activities

### 18. Shifting Cultivation Control

Agrobusiness Management

Biotechnology

Resource Economic

Human Relation

Laws Agrarian

Forestry Laws

Social forestry

Soil and Water

Human resource management

Fire controll

Regional planning

Sociology

Agroforestry

Business Administration

International Relation

Common Laws

Laws

Environment Science

Communication

Conservation Cooperation

Social marketing

Forestry extension

Social psychology

Rural sociology

Professional manpower for the following activities.

### 19. Natura Reserved management

Accounting and cost	Operation Research
Environment impact analysis	Interpretation
Marine biology	Social marketing
Forest biology	
Aquatic and marine ecology	Forest engineering.
Habitat	Plant breeding
Human relation	Animal breeding
Public relation	Forest regulation
Laws	Education
Common laws	Habitat management
Agrarian laws	Fauna management
Forestry laws	Forest Fire
Climatology	Remote sensing
Environment science	Forest valuation
Soil Science	
Wild life inventory	Forestry extension
Filing	Resource planning
Forest policy	Regional planning
Social Forestry	Animal behaviour
Computer	Forest protection
Communication	Library
Production/Operation management	Social psychology
Strategic management	Forest recreation
Forest management	Silviculture
Human resource management	Management Information system
Forest soil	microbiology sociology
Oceanology	Rural sociology
Statistics	Soil science

Professional manpower for the following activities

**20. Research Center Development and  
Implementation of intermediate technology**

State administration	International relation
Human relation	Public relation
Filing	Forest policy
Strategic management	Education
Human resource management	Social marketing
Extension	Organization behaviour
Management Information system	

Professional manpower for the following activities.

**21. Researcher quality and quantity development**

International relation	Human relation
Laws	Filing
Forest policy	Social marketing
Human resource management	Education
Manag. Information system	Social psychology

Professional Manpower for the following activities.

**22. Research cooperation**

System analysis	Education
International relations	Human resource management
International management	Public relation
Strategic management	Forestry policy
Manag. Information system	Human Relation

Professional Manpower for the following activities.

### **23. Regional Research Agency Development**

Office administration	Organization behaviour
System analysis	Strategic management
International relation	Filing
Public relation	Forest policy
Manag. Information system	Human resource management

Professional Manpower for the following activities.

### **24. Increasing the quality of human resource.**

International relation	Laws
Human relation	Filing
Forest policy	Mang. Infor. System
Human resource management	Education
Social psychology	

Professional Manpower for the following activities.

### **25. The increasing of forestry education, training and extension**

International relation	Human relation
Laws Forestry	policy
Common laws	Agrarian laws
Communication	Cooperation
Human resource management	Education
Social marketing	Forest extension
Library	Social psychology
Manag. Information system	Organizational Behaviour

Professional Manpower for the following activities.

## 26. Rule and regulations

State administration	Education
Business administration	Human resource management
Public relation	Strategic management
Human relation	Forest laws
Laws	Corporate laws
Common laws	Trade laws
Forest policy and politic	Agrarian laws

Professional Manpower for the following activities.

## 27. Forestry Controll development

State administration	
Office administration	Filing
Accounting and cost	Computer
Analysis System	Communication
Environmental impact analysis	Strategic management
Resource economy	Organization behaviour
International relation	Library
Public relation	Social Psychology
Human relation	Laws
Forest policy and politics	Corporate laws
Manag. Information system	Human resource management

Professional Manpower for the following activities

### 28. International Cooperation

State administration	International management
Accounting and cost	Public relation
Human relation	Forest Policy
Laws	Corporate laws
Manag. Information system	Communication
International management	Rural sociology
Financial management	Social marketing
Strategic management	Forest extension
Forest resource management	Organization Behaviour

Professional Manpower for the following activities.

### 29. Increasing ability of Forest Official

State administration	Accounting and cost
International relation	Public relation
Human relation	Laws
Common laws	Office administration
Analysis System	Economic resource
Forestry laws	Forest policy and politics
Social Forestry	Cooperation
Forest management	Forest industrial management
Human resource management	Operation Research
Education	Forestry extension

Based upon the above study the summery of the manpower needed is as follows :

Professional Manpower for the following activities.

**Professional Manpower needed**

State administration  
Office Administration  
Agribusiness administration  
Agroforestry  
Accounting and cost  
Environmental Impact Analysis  
Marine biology  
Forest biometrics  
Biotechnology  
Business administration

Forest biology  
Dendrology  
Forestry diplomacy  
Aquatic and marine ecology  
Forest economic  
Resource economic  
Trees physiology  
Geodesy and cartography  
Geology and geomorphology  
Habitat

Forest Product entomology  
Forest entomology  
Forest hydrology  
International relation  
Human relation  
Public relation  
Laws  
Common laws  
Agrarian laws  
Trade laws

Corporate laws  
Forestry laws  
Climatology  
Wood science  
Work science and ergonomy  
Environmental science  
Soil science

Wild life inventory  
Filing  
Forest policy and politics  
Social Forestry  
Wood chemistry  
Computer  
Communication  
Soil and water conservation  
Cooperation  
Business management

International management  
Financial management  
Marketing management  
Production/operation management  
Strategic management  
Watershead management  
Warehouse and stock management  
Forest management  
Industrial Forest management  
Human resource management  
Forestry machineries

Microbiology of forest soil  
Oceanology  
Operation Reseach  
Wood panel  
Interpretation

Logging  
Non Wood Harvesting  
Marketing  
Social marketing  
Transportation network and Forest Engineering  
Tree improvement  
Plant breeding

Animal breeding  
Forest regulation  
Education  
Wood Preservation  
Habitat management  
Quality control  
Wood drying  
Wood working  
Sawmilling  
Remote sensing

Forest valuation  
forest Pathology  
Forest extention  
Work shop and forest machinaries  
Forest planning  
Forestry planning  
Resource planning  
Regional planning  
Organization behaviour  
Animal behaviour

Honey bee  
forest protection and forest fire  
Library  
Natural silk  
Agriculture  
Husbandry

Fishery  
Social Phycology  
Pulp and paper  
Forest recreation  
Silviculture  
Management Information system  
Sociology

Rural sociology  
Statistics  
Seed technology  
Industrial technology  
Wood technology  
Wood mensuration

### 3.1.1 Grouping of Professional Forester

Wenger (1984), classifies forestry activity into 25 groups as it is written in Forestry Handbook published by John Wiley & Son Inc., New York. These groups are .

#### FORESTRY ACTIVITY (Wenger Version)

1. Forest ecology
2. Geology and soil
3. Forest meteorology and climatology
4. Forest insect and Disease Management
5. Fire Management
6. Timber measurement
7. Timber inventory
8. Silviculture
9. Genetic improvement of forest tree
10. Logging
11. Forest product Utilization
12. Forest Hydrology and Watershed management
13. Forest wild life and fish management
14. Range management and Ecology
15. Outdoor Recreation management
16. Urban forestry
17. Analysis for Managerial Decision
18. Forest Road Engineering
19. Surveying
20. Remote sensing
21. Forest resource law
22. Management of people
23. Communication and public Involvement
24. Safety
25. Mathematic and Statistic

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It is unclear how Wenger build forestry activity into that group. Yet if classification of professional man power is analyzed from forest activity description, it could be consist of planning group, sylviculture and conservation, harvesting, processing of forest product, social-economic of forestry and group of other than forester. The result of classification are as follows :

#### **A. Forest Resource Planner Group**

In this group gathered professional on forest and utilization planning activities i.e. experts of compiling, processing, preparing, analysing, estimating and projecting data. This group consist of professional manpower specialize on :

Forest Planning

Forestry planning

Resource Planning Regional Planning

Forest valuation

Forest inventory

Tree measurement

Wild life inventory

Dendrology

Geodesy and Cartography

Geology and geomorphology

Climatology

Soil science

Marine biology

Analysis System

Forest biometric

Operation Research

Statistics

Computer

Remote sensing.

## B. Silviculture and Forest Conservation Group

In this Group there are skilled for preparation and rejuvenation of other region, the maintainance and stabilize of forest and the other resouce region. The professional manpower in this group are :

Silviculture

Tree physiology

Forest protection

Forest fire

Soil and water conservation

Forest ecology

Environmental impact analysis

Forest soil microbiology

Soil science

Forest hydrology

Agroforestry

Honey bee

Social Forestry

Nature silk culture

Biotechnology

Tree improvement

Animal breeding

Plant breeding

Habitat

Habitat management

Animal behaviour

Forest phatology/disease

Forest product enthomology

Forest enthomology

Controll of pest and disease

Seed technology

Game management

### C. Harvesting Forest Product Specialist

In this group there are harvesting timber crop specialist dan other forest product harvester which is consist of environmentalist field professional. These group consist of specialist in the field of :

Forest Planning  
Regional Planning  
Forest Regulation  
Forest Valuation

Analysis System  
Operation Research  
Computer Science

Environmental Impact Analysis  
Habitat Management

Soil and Water Conservation  
Sylviculture

Production/Operation Management  
Warehouse Management  
Forest Managemen  
Human Resource Management  
Management Information System

Wood Harvesting  
Non Wood Harvesting  
Forest Road and forest Engineering  
Work Science and Ergonomy  
Harvesting Machineries  
Machineries Workshop  
Timber Measurement  
Timber Grading

#### D. Forest Product Processing Specialist Group

In this group there are professional man power specialize on processing forest product mechanically or chemically. This group also responsible to increas the quality of forest product. The professionsl manpower in this group are :

Analysis system

Operation Reseach

Computer

Wood Science

Wood Chemist

Wood Panel

Pulp and Paper

Industrial Technology Environmental Impact Assesment

Work science and ergonomy

Operation/production manager

Stock manager

Forest Industrial Manager

Human resource manager

Organization Behavior

Management Information system

Logging

Harvesting non wood

Forest road and and forest engineering

Logging machines

Sawmilling

Wood Preservation

Wood Drying

Quality Controll

Wood Machineries

Wood measurement

Timber Grading

## E. Socio-Economic Forestry Specialist

This group consist of professional manpower who can arrange the development of science and technology on culture and economic of forestry. The group consist of specialist on :

Forest Policy

Forest economic

Agribusiness

Business Management

International Marketing Management

Finacial Management

Marketing Management

Production/Operation Management

Strategic Management

Forest Management

Forest Industrial Management

Human Resource Management

Marketing of Forest Product

Management Information System

Human Relation

Public Relation

Interpretation

Social Marketing

Forest Diplomacy

Forest Extension

Organizational Behavior

Social Psychology

Rural Sociology

## F. Non forester group

### a. Legal Group

Laws

Customary laws

Environmental laws

Trade/corporate laws

Forest Laws

### b. Economic group

International Economic

Corporate economic

Co-operation

### c. Engineer group

Civil Engineer (dry)

Civil Engineer (wet)

Machine Engineer

### d. Health group

Doctor/community health

### e. Teaching and educational group

Education of basic science (Biology, Chemistry, Physics, social and economic science)

## 3.1.2. Professional Field manpower Needed

By further study it can be seen that there is a difference interest between field professional and "office" professional. Basically the the central work of forestry field is on a forestland. This land are divided according to it function into 3 group namely reseve and

nature conservation forest, protection forest and production forest. This grouping are follow the Guidance on the Spatial Forest Regulation. The land use criteria are as follow :

- a. Protection for below area.
- b. Local protection Area
- c. Natural and Cultural Conservation Area
- d. Environmental hazard area

With this criteria it can be seen that the production forest has the same treatment with cultivation area. Meanwhile the production forest has also protective function beside as productive forest.

Based upon the analysis of the mayor activity in managing of natural reserve, production and protection forest, it can be identified that the professional manpower needed for continually forest management as follow :

#### **I. Professional manpower needed for Natural Conservation and Natural Park (including Marine Park)**

Resource Planning  
Resource inventory  
Social survey  
Regional planning  
Resource planning  
Forest biometrics  
Statistics  
Geodesy and Cartography  
Forest ecology  
Aquatic and marine ecology  
Forest biology  
Marine biology  
Habitat management  
Wild life management  
Animal behaviour  
Hydrology  
Environmental science

Soil science  
Oceanology  
Laws

Forest road system  
Forest engineering  
Landscape Architecture  
Forest Regulation  
Animal breeding  
Plant breeding

Resource economic  
Forest/water recreation

Extension  
Social marketing  
Sociology  
Rural sociology  
Social phycology  
Interpretation  
International relation

Environmental impact analysis  
Physical Development Assesment

Forest protection  
Marine protection  
Investigation and police regulation  
Forest fire

## II. Professional Manpower needed on the management of Protection Forest

Resource planning

Regional planning

Environmental impact analysis

Landscape architecture

Forest biology

Biotechnology

Forest ecology

Aquatic ecology

Forest Hydrology

Environmental science

silviculture

Forest soil

Seed technology

Forest biometrics

Forest Regulation

Remote sensing

Geodesy and cartography

Resource inventory

Watershed management

Forest road

Agroforestry

Soil and water conservation

Habitat management

Forest protection

Pathology and entomology control

Forest Fire

Forest product processing

Plant improvement

Agriculture product processing  
Resource economy  
Human resource management  
Animal behaviour  
Extension  
Social marketing  
Public relation  
Human relation  
Rural sociology  
Social survey  
Forestry law  
Customary law

Fishery  
Plantation estate  
Agriculture  
Husbandry  
Forest recreation

### **III. Professional manpower needed in the management of Production Forest.**

1. Indonesian Selective Culting and Planting System (TPTI) in the concession forest.

Forest planning  
Forest inventory  
Statistic  
Forest valuation  
Remote sensing  
Geodesy and cartography  
Forest Regulation  
Dendrology  
Timber measurement

Forest road and Forest Engineering  
Harvesting Timber Crop

Timber Grading  
Work shop and Machinaries  
Environmental Impact analysis

Silviculture  
Pathological and entomological control  
Forest Fire  
Forest soil

Strategic management  
Financial management  
Marketing management  
Production management  
Human resource management  
Organization

## 2. Community Development (Bina Desa Hutan)

Agriculture  
Husbandry  
Fishery  
Agribusiness  
Co-operation  
Extension  
Social marketing  
Rural sociology

## 3. Forest concession and environmental problem.

Environmental impact analysis  
Geology and geomorphology  
Soil and water conservation  
Air conservation  
Coastal conservation  
Forest ecology

Aquatic ecology habitat management  
Spatial planning  
Wild life management  
Doctor/community health  
Sociology  
Social phycology

#### **IV. Forest Distric Office**

Forest Policy and regulation  
Forestry planning  
Strategic management  
Forest planning  
Forest inventory  
Analysis System  
Forest biometrics  
Remote sensing  
Statistics  
Wood measurement  
Wild life inventory  
Computer  
Mapping  
Dendrology  
Geodesy and Cartography  
Geodesy and Geomorphology  
Habitat management  
Forest hydrology  
Soil science  
Forest soil microbiology  
Investigation and police administration  
Forest regulation  
Spatial planning  
Forest Road  
Logging  
Sylviculture  
Forest relation, economic

### 3.1.3. The Priority Development of Professional Manpower

Basically professional manpower who managed the forest and forestry are the foresters. As of the science and technological forestry are developed, the profession other than forester are needed in managing forest such as Engineer, Economist, sociologist, agriculturist and so on. Those other professional help the foresters to solve forest management problem. However because of the specific activity in forest management it will take time for other professional to carry out their field work. So the profession manpower needed for proper managing of the forest are those who have forestry basic science.

Considering the development of forestry activity during this period and the aim and target of forestry development in the future, it should be developed professional forester. The manpower development needed mainly are environmentalist forester.

Professional manpower priority which should be developed are follows :

#### a. Resource planner group

In this group it should be taken to attention are the following professional :

Forest valuation

Forest inventory

Forest biometric

Remote sensing

Considering its role in arranging the forest management plan, it should take the attention to professional career on that field.

#### b. Sylviculturist group

In this group the specialization which should be developed are :

Biotechnologist

Trees and plant improvement specialist

Seed technologist  
Habitat management specialist  
Sylviculturist

The first three specialist mentioned above is the key for forest development. Where as activity for habitat management is an activity to secure sound environment.

#### **c. Harvester Timber group**

Forest by product in our forest are very potential one. However the technic and method of harvesting is not development yet. So our attention are to develop the specialist on :

Harverting of non wood product  
Forest handiing  
Harvesting equipment  
Timber and non wood grading

The road system specialist and forest engineer should be taken more attention. These specialization has a graet influence to the sustainability of forest. cause its impact if those activity is performed insufficiently. Further the present attention should be given the specialication on logging machineries. As we know that the present logging equipment are produce in develope countries. These equipment are design for clear cut system even-though Indonesian follows selective cutting system.

Timber grader are the man who grade the timber and pointed the value of the timber. So the timber grader should be appointed as a functional officer.

#### **d. Forest product prossesing specialist**

In this group an attention should be focus to Wood Science specialist, especially to wood chemist. It is because chemical prossesing could make so many product. As Egon Glesinger has declare 40 years ago that the next century is wood century. Using chemical prossesing, one can make pulp, paper, rayon, plastic etc. Meanwhile we could make protein for animal feeding.

So the specialist that should be develop are :

Wood scientist  
Wood chemist  
Furniture designer

**e. Socio economic forestry specialist group**

In this group the development of agrobusiness should be anticipate considering there are many areas suitable for taungya system (mix cropping) or farming below the standing tree. This agribusiness is very waited by the peasants and other community around the forest.

In the social group, the main focus should be given on extending the extension activity. Beside the konvensional extension work, it should be develop the public relation approach to grow the best image and favour of forestry activity.

Other problem which should be developed too is social marketing including the skill of forestry diplomacy. The social marketing is a system to bring the community to perform activities connected with the rehabilitation and utilization of forest product using marketing technique. This sytem is more effective as developed by Family Planning Agency (BKKBN) in trading the family planning program.

In the international world the effort in avioding negatif issue should be perfomed with diplomatic step. For this purposed it is needed diplomacy skill on every forester else then conventional technic. The main forest diplomacy skill are the technic of lobbying for developing forestry image.

This in group the priority development of professional manpower are :

Agrobusiness mainly forestry business specialist  
Extension and public relation specialist  
Interperater  
Social marketing specialist Forest diplomacy spacialist  
Forestry law specialist.

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It is shown that all field needed to be developed are purposed for functional position. By the functional position the development skills in any positions could continue and raised onward.

### 3.2. Manpower qualification.

#### 3.2.1. Classification of Professional manpower

The main classification of professional manpower are based upon working places. For this purpose there are two classification i.e. those who work in central office and on the field/region. This division is based upon the view of the manpower concerned and the speed of decision making.

Other than this qualification, professional manpower who will perform the forest management in Indonesia could be grouped on :

a. Structural employee

b. Functional employee

Tutor/Instructor

Researcher

teacher

Forestry extension Worker

Guard

Filers

Computer processor

Forestry technicians, consist of :

Forest mensuration field

forest inventory field

Forest Harvesting Supervisor

Forest product Grading Supervisor

Reboisation field

Soil Conservation field

Forest Conservation and Environment Field

Non Wood Cultivation field

Biological Conservation Field

Outdoor Recreational Supervisor

### 3.2.2 The Ability of Professional Man Power

#### a. Structural Man Power

Betts (1991) wrote that the supervisor job cover the activities at all management level from the top management (top executive) which directly supervise senior manager down to foreman who supervise a group of labor.

If we could implement the supervisor task on a structural officer, it can be said that the structural officer is a person who have authority and responsibility on planning and controlling of a labor or a group of person as his subordinate. So the structural officer is a man who have entitled to instruct the subordinate to do a job which is under his responsibility. Meanwhile this officer has to coordinate with the same level officer and has to make a recommendation or suggestion to the upper level concerning of certain job.

In practice there is no structural job which are really same even the level of the officer are similar. According to its duty and responsibility, the government structural officer can be classified into echelon I up to echelon V.

According to Betts (1991) the supervisor could be classified into several level as follow :

1. subordinating primary group consist of several labor
2. subordinating a section consisting of several primary group.
3. subordinating a department consist of several section
4. subordinating several activities consist of several department.

Analog to the supervisor job, it can be said that the main task of a structural officer are :

1. To build and maintain the unity of the activity of organization
2. To develop and maintain the creativity of subordinate
3. To controll the activities

For those assignment one needs a high quality man power. It is difficult to measure quantitatively the structural manpower quality cause to many influence factors. In general the quality of man power are measured according to its intellegence. The easiest way to

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measure this intelligence is looking into its index of his academic prestige during his formal education or training. Usually the academic index more than 2.5 (on scale of max. 4) is properly enough to handle and develop its professionalism.

Beside his intelligence, a structural officer in general and a professional in special has the ability concerning his task management. The basic ability for those person are :

(a). Spirit

The spirit and enthusiasm of structural officer could make his subordinate getting more self-trusted on doing their job. This spirit usually need together with energetic attitude and high vitality. To keep the high vitality its need proper time management based on proper working plan.

(b). Leadership

The leader will be obey by the follower if he has more physical and mentally ability (including the knowledge and intelligence). It is difficult to measure the level of leadership even the result could be felt by everyone. Up to now people believe that a leader could'n be taught.

(c). Skill

There are 3 kind of skill should be own by every structural officer namely technical, social and conceptual ability. The higher the level of the structural officer the bigger the must to have the conceptual ability. It seem that the social relation ability is not so much change as the officer raise his level from the lower rank to the higher one.

1. Technical Skill

The technical skill mean the one's ability to know how to proceed his task so he can eliminate the unnecessary mistake, to hinder the spendthrift and to eliminate the probability accident. Those ability are very important to a structural officer especially the professional one who arranging the vulnerable field work like logging, road construction, using heavy equipment etc. As a professional worker, the officer should know exactly why a kind of activity should be done and how to

do properly. Basically the lower level perform his task by showing the technical ability to do that job. The structural officer do handle his subordinate's job by analysing the job theory.

Betts (1991) wrote that technical skill is the ability to aplicate the knowledge, experience and other technical activities or to aplicate work method on a duty using the proper facility and equipment.

## 2. Social relationships skill

Simply speaking, this skill is for making relationship among colleague or working together with other people. Usually this skill progress very slightly because human interaction develop slowly and need patience, tolerance and perseverance.

## 3. Conceptual Skill

The ability to interpret natural phenomenom needs experience and proper knowledge which will be get in a long time. So training and experience to solve the problem and studying the essence of an activity is necessary for structural officer especially for high rank echelon. This conceptual skill is the ability to take harmonic action with the intended goal.

## b. Functional Man power

The functional officer is an employee who do a specific activities. The progressive of it career is based on cummulative prestige index.

So the functional officer should have a certain skill, ability or activity which can be shown or proofed to get acknowledgement in a kind of prestige index. It can be seen from the building process that the functional officer activity is started from the identification result of a kind of a job which is derived from forestry activity. So the functional officer job is a job that can be done by his own. This kind of officer needs the ability to implement his knowledge or theory to become a valuable job. The officer basic knowledge is the knowledge which can conduc him to identify the problem or to analyze the phenomenom

in such a way that he can solve the problem through the proper examination or analysis. Meanwhile there is other functional officer job which should be done by the officer repeatedly as a routine activity according to a certain procedure such as teacher, forest guard, instructor, extension worker etc. The higher the rank of the officer the higher the logical ability and the broader his knowledge. Certainly this job has hierarchical rank.

### c. Non Structural Man Power

A non structural officer is a person who assign as a facilitation agent for supporting the functional officer job or structural officer job. The non structural officer is to be hoped can give a suggestion input or could do his task based on his knowledge or his profession. Generally speaking the non structural officer is a staff who have not his own decision making. As a facilitation agent, the non structural officer is to be hoped has the ability to implement a certain knowledge or skill.

## CHAPTER IV STRATEGY OF INCREASING MAN POWER RESOURCES

FAO study (1991) stated that the need on professional worker in the next 10 years is 8,000. Hence, it is necessary from now on to handle it concretely. By this target, in the year 2,000 the amount of professional worker in the government office are less than those in private office.

The development of private need to increase professional worker would be happened if forestry development plan really touch forest exertion. As we know that the forest which is utilized by HPH are entirely belong to state. So it is necessary to prepare all about rule and regulation for private so that those entrepreneurs will act wisely when they produce their forest product.

Recently, there are a lot of government activities done by private, such as rural community development, making map of potential areas, manage of forest preserve and protected, etc. This activity, especially located in the HPH area, has not reached yet by the government official. If the government officer can reach those areas, they will make closer relationship with private. By managing remote protected areas and doing the activity which directly contact with HPH, it is hoped that it can be penetrate the attitude of forestry professional into HPH entrepreneur.

Those two strategies above, forestry development plan touching HPH business and strategy of attitude penetration on professional forestry are strategy required in the future in increasing HPH professionalism business activities.

Strategy to increase professional man power quality in the field of forestry can be carried out by:

### a. Professional man power requirement

Usually requirement staff is the duty of personal manager. By this way, the requirement is only for searching labor. Whereas employee especially professional worker should be treated as company or institution investment or assets. In order to do that when recruiting new employe, made them productive for their institution and satisfied for

themselves. By new employee it include one who has a new assignment, promoted or new duty staff. This system is called proactive system. According to Werther and Davis (1993), A company purposes that applied proactive approach is to create an effective orientation program. This approach covers the involving of applicant chief which describes the detail of job description and make communication with other worker which guarantee that their activities are going well.

By the proactive technique the newly worker will know his duty precisely in advance. So he will do his job with no doubt when he works for the first time.

Another technique is through a job training. By this way, the applicant will know the scope of his duty he will be faced. By this way also the applicant will do his job with no doubt, besides gives the applicant the opportunity to prepare his duty with his knowledge he got.

Other effort to increase worker capability especially newly worker is to help the integration of the worker into the organization involved. By this program, it is expected that newly worker can easily understand and accept rule, norm and habit of the institution.

One of the tests should be taken by professional applicant is Aptitude Test. This is as a tool to predict work capability. The prediction of applicant capability is more accurate through this test than other one.

#### b. Education and Training

As we know to gain promotion in Indonesian Army (ABRI), each personale has to take further education. This technique should be applied in the forestry institution, because it is not only needed by the applicant but also cause of the fast development of science and technology. This is an efficient way to spread out science and technology is through education and training process.

One of the efforts to develop education and training in this field is cooperation between Forestry higher education institution and international boards with institution of man power resources in government or private institution of forestry. Higher education institution is expected to carry out education and training in the field of forestry strategics.

Usually the performance of newly worker has not seen yet, even though he has taken job training. Accordingly, they should have taken training before getting their real duty. The training covers on the job training and training in a group working.

C. ARNOLD ANDERSON a professor of Education and Sociology Science of Chicago University, USA, stated that if the youth gives only general education, there will be lack of vocational worker in the future. On the contrary, when we train a half skill worker fast, they will not be able to change the job automatically.

According to KOLB, et al. (1991), the way of education should be changed from academic activity to experiment activity will make one more skillful. Whereas for the students should be changed from academic performance oriented to future anticipation oriented.

By education and training the inner feeling of the students will develop. This is very important in character building of forestry worker.

#### c. Constuction of Professional Worker

In the late 50 years, the organizational behavior has been changed due to the changing of management style. Formerly the manager do is to manage people, now it change to manage work. From the manpower view the other important change is the changing of the manager view from development organization to development one's career.

Every employee eager to know what happend to his career in the futute. So it should do to evaluate the ability of one's capability. By this evaluation, means that there should be exist standard work, measurement work method and work measurement periodic. Based on this evaluation, the the development of man power could be done through education, training, promotion or tour of duty.

The other important thing is the arrangement of transparant employe career. It means that every personnel manager can show the career planning for every employe in its institution.

## CHAPTER V ACTION PLAN

### 1. **Development Program of Human Resources Management Institution**

The goal of this program is increasing man power resources in forestry institution in general and institution which has related to nature resources management in particular.

The increasing efforts of management institution capability is carried out through training and giving certificate to the manager of man power resources. In doing managerial of man power resources training and education, it is expected that the manager of man power resources has broaden insight on worker aspects and follows the development management of man power resources.

Besides, it is necessary to develop the standard procedures of professional worker recruitment and job training standard, orientation system, and professional worker recruitment modul.

### 2. **Education and Training Program of professional Worker**

The goal of this program is to increase the capability of professional worker in forestry through education and training. Based on this study there are 112 kinds of professional worker can be identified which is needed for managing forest and forestry wisely. From the various kinds of professional worker it is necessary to make it into group of skills which is more relevan to the structure of science tree rationally.

According to Duryat (1993), agricultural science in broader meaning consists of food crop, estate crop, horticulture, husbandry science and veterinary of public health, fishery and forestry science. Every science has branches and twigs, those branches and twigs make science tree including forestry science tree. In order not to make problem and communication gap amongs forestry science it is necessary to have a standard "Forestry Science Tree". This standardize is needed mainly by Forestry Education and Training Center in planing, arranging and developping education and training programme. In this connection, Duryat (1993) has appoint a reference of Forestry Science with 9 main branches are as follows :

1. Ecosystem of Forest
2. Silviculture
3. Exploitation, Work Science, and Forest Engineering
4. Forest Deterioration and its Protection
5. Tree/Stand Growth Measurement and Terrestrial Measurement/Mapping.
6. Forest Management and Utilization
7. Forest Product, Processing and Utilization of Forest Product
8. Transportation, Wood Industry and Marketing
9. Forestry sector in National Government and Development

From those 9 main branches then can be developed to "branches and twigs" on forestry science which can be shown completely in appendix 5, Further, Duryat explain that the composition of forestry science tree is based on the guidance of Prof.Dr.Zufri Hamzah, Prof.Ir.Sukiman Atmosoedarya and Dr. Yunus Kartasubrata.

Thus, it is clear that if science tree can be developed, education and training planning can be done more streamline.

It is necessary to explain here that Education and Training of Professional Programme should be formulated, so the training procedure, kind of skill needed by every professional worker mainly to those who potentially get promotion soon could be formulated too.

### **3. The Development of the Center of Forestry Professionalism**

Nowadays our knowledge and experience on characteristics and condition of growing stand is very limited. The delay of this science and technology development which is related to the five professional forester group (as explained at the previous chapter) among other are caused of the lack of the professional employe who will handle those field. The construction of the center of professional development on forestry related, are purposed that the role and the expertise of professional forester can be raise as soon as possible through procedure and level standard.

#### 4. **The Development of the Technician Qualification Programme**

Even that a professional worker can work independently, but the need of technician level is very much in order to get the proper activity goal. If it is a gap on technician duty, there will be exist the professional worker energy waste. So it is time to arrange the relevance technician level. After that it should be developed standard procedure for selecting, recruiting and guiding the technician worker in order to make harmony with the professional worker need on forestry field.

#### 5. **The Cooperation on Managing of Biodiversity Programme among National Research Institute (LIPI), IIPH. Research and Development Board (Badan Litbang)].**

Forest is an excellent natural laboratorum. On the other side the managing and indentifying the biodiversity is only a cost center. So if the three institution can work cooperatively, they can develop an enormously forestry science and technology based on biological characteristic of forest. These cooperation will bind the need of the professional structural, functional and non structural forestry officer in a continuation activity process. So the career and development level of professional worker can be done through tour of duty and tour of area at a proper planning

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lampiran 1.

Jumlah Master dan Doktor Berdasarkan Bidang  
Studi Lingkup Departemen Kehutanan

Bidang Studi	Program		Jumlah
	S3	S2	
1. Forest Planning		3	3
2. Forest Inventory/Survey		15	15
3. Forest Management	4	6	10
4. Forest Harvesting	1	1	2
5. Remote Sensing		6	6
6. Aerial Survey		2	2
7. GIS/System Analysis		5	5
8. Biometrics		2	2
9. Applied Statistics		2	2
10. Wood Science	5	20	25
11. Forest Product	1	2	3
12. Forest Industries Tech.	1	7	8
13. Silviculture		10	10
14. Tree Improvement		1	1
15. Bio Tech.		1	1
16. Agroforestry		3	3
17. Agroclimatology		2	2
18. Sericulture		2	2
19. Entomology	1		1
20. Aviary		1	1
21. Natural Resources Mgt.	1	15	16
22. Environmental Science	1	2	3
23. Watershed Mgt.	1	11	13
24. Soil Science		4	4
25. Soil Conservation Mgt.		2	2
26. Regional Planning		3	3
27. Outdoor Recreation		4	4
28. Forest Fire		3	3
29. Ecology		3	3
30. Landscape		3	3
31. Wildlife Mgt.		7	7
32. Forest Economics	5	11	16
33. Operation Research	1		1
34. Sosial Economics	1	1	2
35. Business Administration		6	6
36. Agrobusiness Mgt.		8	8
37. Comunication		3	3
38. Sociology	1	1	2
39. Education	1	6	7
Jumlah	25	184	209

(Sumber Biro Kepegawaian Dephut, Januari 1993)

Lampiran 2

Bidang Keahlian (S2/S3) Yang Diperlukan Untuk  
Setiap Fungsi Di Departemen Kehutanan

Fungsi	Detail Fungsi	Bidang Keahlian
Fungsi Utama	Jabaran Fungsi	
A. Pemantapan pra-kondisi pengelolaan hutan melalui inventarisasi penatagunaan hutan dan penataan kawasan	a. Identifikasi dan Inventarisasi	a1. Penginderaan Jauh b1. Fotogrametri c1. Biometri d1. Dendrologi
	b. Penataan Hutan	a1. Manajemen DAS b1. Perencanaan Wilayah c1. Ilmu Tanah d1. Perencanaan Hutan
	c. Pengukuran dan Pemetaan	a1. Penginderaan Jauh b1. Geodesi dan Kartografi
	d. Pengukuhan Hutan	Hukum
B. Pemangkuan dan Pemanfaatan Hutan	a. Pemolaan dan Pengusahaan Hutan	a1. Perencanaan Hutan b1. Ekonomi Hutan
	b. Penataan Kawasan dan Pembukaan Wilayah	a1. Perencanaan Hutan b1. Eksploitasi Hutan
	c. Eksploitasi Hutan	a1. Eksploitasi Hutan b1. Ergonomi c1. Perencanaan Hutan d1. Riset Operasi
	d. Pengolahan Hasil Hutan	a1. Ilmu Kayu b1. Panel Kayu c1. Teknologi Industri d1. Pengawetan Kayu
	e. Distribusi	Ekonomi Kehutanan
C. Reboisasi dan Rehabilitasi	a. Perbenihan dan Pembibitan	a1. Pemuliaan hutan b1. Teknologi Benih c1. Persemaian d1. Teknologi Biro e1. Hama dan Penyakit f1. Biometrika

Fungsi	Detail Fungsi	Bidang Keahlian
Fungsi Utama	Jabaran Fungsi	
D. Konservasi Sumber daya Alam	b. Penanaman	a1. Silvikultur b1. Hama dan Penyakit c1. Agroforestry d1. Kehutanan Masyarakat e1. Ilmu Tanah
	c. Konservasi Tanah	a1. Ilmu Tanah b1. Manajemen DAS c1. Konservasi Tanah dan Air d1. Perencanaan Wilayah e1. Agro Klimat f1. Hidrologi
	d. Peningkatan Nilai Ekonomis Kawasan HTI	a1. Ekonomi Kehutanan b1. Perencanaan Hutan c1. Silvikultur d1. Riset Operasi e1. Agroforestry
	e. Budidaya Hasil Hutan Non Kayu	a1. Silvikultur b1. Persuteraan Alam c1. Perlebahan d1. Entomologi (Lacciverlaca)
	a. Perencanaan dan Pengelolaan Kawasan Konservasi	a1. Pengelolaan Satwa b1. Perencanaan Wilayah c1. Ekonomi SDA d1. Manajemen Tanah dan Rekreasi e1. Biologi Kelautan
	b. Pengembangan	a1. Ilmu Lingkungan b1. Perencanaan Wilayah c1. Manajemen Taman dan Rekreasi d1. Pengelolaan Satwa e1. Biologi Kelautan f1. Ilmu Lingkungan g1. Rekreasi Alam Terbuka h1. Ekonomi SDA
	c. Pengembangan Hutan Lindung	a1. Kehutanan Masyarakat b1. Ekonomi SDA

Fungsi	Detail Fungsi	Bidang Keahlian
Fungsi Utama	Jabaran Fungsi	
	d. Pengembangan Konservasi jenis	a1. Penangkaran Satwa b1. Rekreasi Alam Terbuka c1. Ekonomi SDA
	e. Pengembangan Ecotourisme	a1. Manajemen Taman dan Rekreasi b1. Rekreasi Alam Terbuka c1. Ekonomi SDA
	f. Pengkajiar Dampak Lingkungan	a1. Ilmu Lingkungan
E. Perlindungan Hutan dan Pelestarian Alam	a. Perlindungan Hutan	a1. Kebakaran Hutan b1. Hama dan Penyakit
	b. Pengamanan Hutan dan Hasil Industri	a1. Kehutanan Masyarakat b1. Penyuluhan Kehutanan
F. Penyuluhan	a. Penyuluhan Masyarakat Sekitar Hutan	a1. Kehutanan Masyarakat b1. Agroforestry c1. Penyuluhan Kehutanan
	b. Pengendalian Perladangan Berpindah	a1. Kehutanan Masyarakat b1. Agroforestry c1. Penyuluhan
	c. Bina Cinta Alam	a1. Ilmu Komunikasi b1. Sosiologi
G. Penunjang	a. Pengelolaan Data	a1. MIS b1. Rekayasa Perangkat Lunak Komputer c1. Statistik
	b. Penyusunan	a1. Ekonomi Kehutanan b1. Riset Operasi c1. Perencanaan Kehutanan d1. Ekonomi SDA e1. Perencanaan Wilayah f1. Kebijakan dan Administrasi Kehutanan g1. Manajemen DAS h1. Manajemen Pembangunan
	c. Penyusunan Program dan Proyek	a1. Ekonomi Kehutanan b1. Manajemen Pembangunan

Fungsi	Detail Fungsi	Bidang Keahlian
Fungsi Utama	Jabaran Fungsi	
H. Pembiayaan	d. Evaluasi	a1. Ekonomi Kehutanan b1. Riset Operasi c1. Perencanaan Kehutanan d1. Ekonomi SDA e1. Perencanaan Wilayah f1. Kebijakan dan Administrasi Kehutanan g1. Manajemen DAS h1. Manajemen Pembangunan
	e. Investasi	a1. Ekonomi Kehutanan b1. Manajemen Pembangunan
I. Peraturan Perundangan	a. Pembiayaan	a1. Tidak perlu S2/S3
	a. Penyusunan Peraturan Perundangan	a1. Hukum b1. Kebijakan dan Administrasi Kehutanan
	b. Bantuan Hukum	a1. Tidak perlu S2/S3
	c. Evaluasi Kebijakan	a1. Hukum b1. Kebijakan dan Administrasi Kehutanan
J. Sumber Daya Manusia	a. Perencanaan SDM	a1. Perencanaan SDM b1. Pengembangan SDM c1. Manajemen SDM
	b. Pengembangan SDM	a1. Pengembangan SDM b1. Ilmu Pendidikan
	c. Pendayagunaan SDM	a1. Manajemen SDM b1. Pengembangan SDM
	d. Kelembagaan	a1. Pengembangan Organisasi b1. Perilaku Organisasi

Fungsi	Detail Fungsi	Bidang Keahlian
Fungsi Utama	Jabaran Fungsi	
K. Sarana dan Prasarana	a. Pengelolaan Sarana dan Prasarana	a1. Sistem Informasi Manajemen b1. MRP
	b. Pengelolaan Arsip dan Kepustakaan	a1. Sistem Informasi Manajemen b1. Arsip
L. Hubungan Masyarakat	a. Hubungan Masyarakat	a1. Hukum b1. Kebijakan dan Administrasi Kehutanan c1. Hubungan Internasional

Sumber : Pusklat Dephut dan HoBase Delta Harmony (1993).

Lampiran 3

Deskripsi Bidang Keahlian Yang Diperlukan  
Oleh Departemen Kehutanan

No.	Bidang Keahlian	Deskripsi
1.	Manajemen Hutan	
	1.1. Perencanaan hutan:	Ilmu yang mempelajari alokasi/ peruntukan kawasan hutan sesuai dengan fungsinya serta pengaturan hasil hutan (Forest Yield Regulation).
	1.2. Inventarisasi hutan	Ilmu yang mempelajari potensi kawasan hutan melalui pemanfaatan statistika terapan.
	1.3. Penginderaan Jauh	Ilmu yang mempelajari permasalahan kondisi permukaan bumi, baik kondisi hutan, hidrologi, dsb, melalui pemanfaatan citra satelit.
	1.4. Fotogrametri	Ilmu yang mempelajari penafsiran potensi hutan-hutan, pemetaannya melalui pemanfaatan potret udara termasuk pengembangan sistem aplikasinya
	1.5. Biometrika	Ilmu yang mempelajari forest modelling melalui pemanfaatan dan aplikasi-aplikasi statistika
	1.6. Eksploitasi hutan	Ilmu yang mempelajari teknik-teknik pembukaan wilayah, pemanen, pembalakan hutan dan pengangkutannya
	1.7. Ekonomi kehutanan	Ilmu yang mempelajari penerapan kaidah-kaidah ilmu ekonomi untuk pengelolaan hutan
II.	Teknologi Hasil Hutan	
	2.1. Ilmu Kayu	Ilmu yang mempelajari struktur-struktur kayu, baik sifat-sifat fisika, kimia, dan mekanika kayu

No.	Bidang Keahlian	Deskripsi
	2.2. Teknologi Industri	Ilmu yang mempelajari upaya peningkatan efisiensi sistem industri dengan mengambil manfaat penerapan matematika, fisika, kimia, statistika, dan ilmu sosial.
	2.3. Pulp dan Kertas	Ilmu yang mempelajari prosesing dan pembuatan pulp dan kertas.
	2.4. Ilmu Panel Kayu	Ilmu yang mempelajari tentang proses dan pembuatan panel-panel kayu ( Blockboard), Plywood, Mouling dsb).
	2.5. Ergonomi	Ilmu yang mempelajari tentang proses kerja untuk menghasilkan produktifitas kerja yang optimal
	2.6 Pengawetan Kayu	Ilmu yang mempelajari teknik dan proses pengawetan kayu melalui proses yang fisis dan kimia.
III.	Budaya Hutan	
	3.1. Silvika	Ilmu yang mempelajari interaksi antara pohon dan lingkungan tempat tumbuh
	3.2. Silvikultur	Ilmu yang mempelajari teknik perlakuan tegakan untuk mendapatkan potensi hutan yang maksimal sesuai kondisi lingkungannya
	3.3. Pemuliaan Pohon	Ilmu yang mempelajari teknik-teknik perlakuan untuk mendapatkan jenis unggul melalui uji spesies maupun uji genetik.
	3.4. Dendrologi	Ilmu yang mempelajari teknik-teknik pengenalan pohon.
	3.5. Teknologi Bio	Ilmu yang mempelajari dan memanfaatkan dasar-dasar dan kaidah-kaidah ilmu biologi untuk pengembangan teknologi (Tissue culture, Rekayasa genetik)

No.	Bidang Keahlian	Deskripsi
	3.6. Ilmu Persemaian	Ilmu yang mempelajari teknik-teknik dan metode persemaian.
	3.7. Agroforestry	Ilmu yang mempelajari teknik-teknik dan metode pengelolaan hutan dengan budi daya pertanian lainnya.
	3.8. Teknologi Benih	Ilmu yang mempelajari teknik-teknik metode penyediaan benih dalam waktu yang tepat dengan jumlah yang cukup dan mutu yang tinggi.
	3.9. Penanaman	Ilmu yang mempelajari teknik dan metode penanaman pohon hutan untuk mendapatkan pertumbuhan maksimal.
	3.10 Perlindungan Hutan	Ilmu yang mempelajari teknik-teknik metode pemeliharaan melalui pengendalian kebakaran, perambahan hutan, hama dan penyakit dsb.
	3.11 Kehutanan Masyarakat	Ilmu yang mempelajari intraksi dan kontribusi hutan dan masyarakat di sekitarnya.
	3.12 Persuteraan Alam	Ilmu yang mempelajari pembudidayaan sutra alam, termasuk di dalamnya, pengelolaan ulat sutra dan pemintalannya.
IV.	Pengelolaan SDA dan Lingkungan	
	4.1. Ilmu Lingkungan	Ilmu yang mempelajari interaksi manusia dan lingkungan
	4.2. Manajamen DAS	Ilmu yang mempelajari teknik-teknik pengelolaan daerah aliran sungai (DAS)
	4.3. Ilmu Tanah	Ilmu yang mempelajari struktur, postur dan sifat-sifat tanah (fisis dan khemis).

No.	Bidang Keahlian	Deskripsi
	4.4. Konservasi Tanah dan Air	Ilmu yang mempelajari teknik dan metode pengawetan tanah melalui aplikasi teknis maupun vegetatif
	4.5. Perencanaan Wilayah	Ilmu yang mempelajari perencanaan dan pengembangan wilayah atau tata ruang.
	4.6. Rekreasi Alam Terbuka	Ilmu yang mempelajari perencanaan dan pengembangan wisata atau tata ruang.
	4.7. Landskap	Ilmu yang mempelajari pemanfaatan bentang alam untuk tujuan keindahan (estetika).
	4.8. Hidrologi	Ilmu yang mempelajari tentang tata air dan neraca air.
	4.9. Agroklimatologi	Ilmu yang mempelajari unsur-unsur cuaca dan iklim serta pengaruhnya pada pertanian dan kehutanan.
	4.10. Manajemen Taman dan Rekreasi	Ilmu yang mempelajari pengolahan kawasan tanah nasional dan kawasan wisata atau lainnya.
	4.11. Biologi Satwa	Ilmu yang mempelajari pengembangan biakan satwa liar.
	4.12. Penangkaran Satwa	Ilmu yang mempelajari tentang pengendalian populasi satwa liar
	4.13. Kesehatan Satwa	Ilmu yang mempelajari tentang kesehatan satwa liar.
	4.14. Ekonomi SDA	Ilmu yang mempelajari kaidah-kaidah ilmu ekonomi untuk pengelolaan sumber daya alam.
	4.15. Biologi Kelautan	Ilmu yang mempelajari flora dan fauna laut.
	4.16. Pengelolaan Satwa	Ilmu yang mempelajari bagaimana merencanakan, melaksanakan dan mengevaluasi perlakuan manusia terhadap satwa.

No.	Bidang Keahlian	Deskripsi
V.	Penunjang	
	5.1. Ilmu Komunikasi	Ilmu yang mempelajari teknik-teknik komunikasi untuk menyampaikan pesan-pesan pembangunan kehutanan.
	5.2. Ilmu Pendidikan	Ilmu yang mempelajari teknik dan metode penyusunan kurikulum/dedaktik dan metodik.
	5.3. Geodesi dan Kartografi	Ilmu yang mempelajari teknik dan metode pemetaan.
	5.4. Hukum	Ilmu yang mempelajari tentang aspek-aspek legal.
	5.5. Penyuluhan Kehutanan	Ilmu yang mempelajari teknik dan metode komunikasi untuk merubah perilaku masyarakat sekitar hutan.
	5.6. Riset Operasi	Ilmu yang mempelajari optimalisasi faktor input dalam proses operasi.
	5.7. Kebijakan dan Administrasi Pembangunan	Ilmu yang mempelajari perumusan, analisa dan evaluasi kebijaksanaan pembangunan kehutanan.
	5.8. Ekonomi Pembangunan	Ilmu yang mempelajari kaidah-kaidah ilmu ekonomi proyek-proyek pembangunan kehutanan.
	5.9. Sistem Informasi Manajemen	Ilmu yang mempelajari teknik dan metode pemanfaatan komputer untuk pengolahan data untuk menghasilkan informasi yang tepat, akurat, cepat, untuk pengambilan keputusan.
	5.10. Rekayasa Perangkat Lunak Komputer	Ilmu yang mempelajari penyusunan aplikasi-aplikasi terapan perangkat lunak untuk pembangunan kehutanan.
	5.11. Botani	Ilmu yang mempelajari pengenalan toxonomi, klasifikasi flora langka.

No.	Bidang Keahlian	Deskripsi
	5.12. Sosiologi	Ilmu yang mempelajari interaksi sosial dari dua orang atau lebih
	5.13. Statistika	Ilmu yang mempelajari hubungan antar parameter dalam suatu populasi.
	5.14. Pengembangan SDM	Ilmu yang mempelajari motivasi, pelatihan, dan aspek lain dalam mengembangkan SDM.
	5.15. Manajemen SDM	Ilmu yang mempelajari seluruh aspek pengelolaan sumberdaya manusia dari segi perencanaan, pengadaan, pemeliharaan dan pengembangan organisasi untuk mendukung produktivitas pegawai secara individu dan produktivitas organisasi yang optimal.
	5.16. Perencanaan SDM	Ilmu yang mempelajari perencanaan sumberdaya manusia menyangkut aspek penyusunan kebutuhan peningkatan sumberdaya manusia, seleksi dan rekrutmen, pelatihan, dan pendidikan.
	5.17. Pengembangan Organisasi	Ilmu yang mempelajari bentuk-bentuk organisasi, pembentukannya, perubahannya, termasuk pengelolaan terhadap perubahan-perubahan, dan erat kaitannya dengan perilaku organisasi
	5.18. Perilaku Organisasi	Ilmu yang mempelajari motivasi kerja, kepemimpinan, produktivitas organisasi, dan perpaduan antara produktivitas pegawai secara individu dan produktivitas organisasi.
	5.19. Ilmu Arsip	Ilmu yang mempelajari bagaimana mengelola arsip.
	5.20. Perencanaan Kebutuhan bahan (Material Requirement Planning/MRP)	Ilmu yang mempelajari sistem pengadaan bahan dalam suatu proses produksi.

No.	Bidang Keahlian	Deskripsi
	5.21. Manajemen Pembangunan	Ilmu yang mempelajari aspek-aspek pengembangan wilayah baik di pedesaan maupun di perkotaan, menyangkut aspek fisik, sosial budaya dan ekonomi
	5.22. Hubungan Internasional	Ilmu yang mempelajari aspek hubungan antar negara dari segi hukum, kerjasama ekonomi, politik, Sosial, budaya, pertahanan dan sebagainya.

Sumber : Pusdiklat Dephut dan HoBase Delta Harmony (1993)

Lampiran 4

Karakteristik Keterampilan Manajemen

No.	Uraian Keterampilan	Konsentrasi Manajemen
1.	Pola pikir strategi dalam mendayagunakan sumber daya dibawah penguasaan, untuk mencapai sasaran dan tujuan yang secara jelas sudah diperkirakan sebelumnya, baik secara kuantitatif maupun kualitatif.	"Strategic Manajemen"
2.	Kesadaran dan kepedulian akan perhitungan "cost benefit ratio" dalam setiap langkah tindakannya serta faham akan pendanaan yang cepat, cermat dan akurat bagi setiap investasi yang direncanakan.	"Accounting for non-accountant"
3.	Aplikasi dan interaksi/keterkaitan antara Pemerintah (sebagai motivator dan fasilitator pembangunan ekonomi) dengan kalangan bisnis (sebagai pelaku-pelaku ekonomi) dalam mengatur gerak manuvernya dipasar terbuka secara International	"Participatory Management & Internasional Trade"
4.	Latihan-latihan penerapan kegiatan bisnis produk kehutanan dalam waktu singkat melalui tindakan "trial and error dengan resiko kecil" dan mendapatkan "payback" yang cepat bagi manajer yang mampu dan mempunyai prospek.	"Business Management Simulation"
5.	Kemampuan menumbuh-kembangkan jiwa dan semangat wirausaha yang berdimensi luas dan menjangkau wawasan Internasional.	"Entrepreneur & Intra preneurship"
6.	Pencapaian sasaran produksi dan pemasaran produk-produk agro-industri, baik yang berasal dari industri hulu sampai dengan industri hilir, melalui koordinasi dan organisasi kelompok kerja yang efisien dalam biaya, serta efektif dalam mencapai tujuan.	"Product Management & Marketing"
7.	Kemampuan mengorganisir dan menciptakan suasana kerja serta memotivasi kelompok kerja agar dapat mencapai tujuan kelompok, dengan pengorbanan yang minim.	"Human Resources Management & Development"
8.	Kemampuan berkomunikasi dan mengendalikan mitra usaha patungan yang berasal dari unsur swasta, baik nasional maupun luar negeri secara efektif dan efisien.	"Alient Managent"

No.	Uraian Keterampilan	Konsentrasi Manajemen
9.	Kepribadian yang ulet dan tangguh dalam menerima dan mengatasi tantangan, guna menuju perkembangan diri dan perkembangan organisasi unit kerja yang baik.	"Personality Development"

Sumber : Pusdiklat Dephut dan Indeco Duta Utama (1993)

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2.2.6. Pohon Peneduh, Tanaman Bawah, Tanaman Inang dan Tegakan tidak Seumur

2.2.7. Pemeliharaan Tanaman / Permudaan Usia Muda

2.2.8. Aspek Estetika pada Tegakan Hutan

2.3 Penjarangan Tegakan

2.4 Pemulihan tegakan yang rusak atau terlalu terbuka

2.5 Kombinasi Usaha Kehutanan dan pertanian

2.6 Arboretrin, Taman Hutan, Tanaman peneduh dan tanaman hias

2.7 Budidaya Non-Kayu

2.7.1 Tanaman hias

2.7.2 tanaman penghasil kulit Kayu, buah, biji, daun, getah dsb

2.7.3 Rotan, bambu dan Palma hutan

2.7.4 Penghasil Pakan binatang (ternak ulat sutra alam dls)

2.7.5 Hutan sebagai Penghasil Bahan Pangan (umbi-umbian, cendawan, serangga, satwa buruan dls)

2.7.6 Hutan penghasil tanaman obat-obatan

### 3. EKSPLOITASI HUTAN, ILMU KERJA DAN TEHNIK BANGUNAN KEHUTANAN

3.1 Ilmu Kerja Kehutanan

3.2 Pembalakan dan pengangkutan

3.3 Penebangan Pohon

3.4 Pembersihan Blok Tebangan dan Memanfaatkan Limbah

3.5 Penimbunan Kayu (di tempat pengumpulan daratan atau perairan)

3.6 Pembagian Batang

3.7 Peralatan atau mesin eksploitasi dan angkutan

3.8 Pengangkutan hasil hutan

3.9 Tehnik bangunan dan jalan

### 4. KERUSAKAN HUTAN DAN PENCEGAHANNYA

4.1 Jenis gangguan dan kerusakan

4.2 Kebakaran hutan dan faktor perusak alam lainnya

4.3 Hama dan penyakit pohon

4.4 Kerusakan hutan karena satwa dan ternak

4.5 Kerusakan hutan karena faktor manusia

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ILMU KEHUTANAN DAN CABANG-CABANGNYA  
(SEBUAH KERANGKA ACUAN)

1. EKOSISTEM HUTAN

- 1.1. Faktor -Faktor Tempat Tumbuh
  - 1.1.1. Tanah Hutan
  - 1.1.2. Hidrologi Hutan
  - 1.1.3. Konservasi Tanah dan Air
  - 1.1.4. Erosi
- 1.2 Biologi Hutan
  - 1.2.1. Botani Hutan (Umum)
  - 1.2.2. Botani Hutan (sistematik)
  - 1.2.3. Ekologi Tumbuhan Hutan
  - 1.2.4. Zoologi (Umum)
  - 1.2.5. Biologi Satwa
  - 1.2.6. Ekologi Satwa
  - 1.2.7. Pemburuan, penangkapan, pemancingan dan penembakan satwa darat dan perairan.

2. SILVIKULTUR

- 2.1. Sistem Silvikultur
    - 2.1.1. Susunan dan Komposisi Tegakan Hutan
    - 2.1.2. Bentuk Tegakan Hutan
  - 2.2. Permudaan dan pembuatan Tegakan
    - 2.2.1. Sistem Permudaan Hutan
    - 2.2.2. Permudaan Alam
      - 2.2.3.1 Pemilihan dan Ujicoba Jenis
      - 2.2.3.2 Lahan Permudaan
      - 2.2.3.3 Benih, persemaian dan penaburan
      - 2.2.3.4 Pembuatan Tegakan dengan pembiakan vegetatif
      - 2.2.3.5 Pembuatan Tegakan dengan penanaman benih atau bibit.
    - 2.2.4. Reboisasi dan penghijauan
    - 2.2.5. Pembuatan Tegakan dengan Suksesi Alam
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5. PENGUKURAN RIAP POHON/TEGAKAN DAN PENGUKURAN TERITRIS/PERPETAAN

- 5.1 Satuan Ukuran dan faktor konversinya
- 5.2 Pengukuran tinggi, diameter pohon, volume pohon, volume tegakan dan volume kayu bulat
- 5.3 Pengukuran dimensi khusus (tajuk, kerapatan pohon dls)
- 5.4 Pengukuran kualitas tempat tumbuh
- 5.5 Penentuan umur pohon dan tegakan
- 5.6 Riap pohon, riap tegakan, dan pertumbuhan tegakan
- 5.7 Pengukuran teristris dan perpetaan
- 5.8 Penafsiran potret udara

6. PENGELOLAAN DAN PENGUSAHAAN HUTAN

- 6.1 Teori dan prinsip pengelolaan
- 6.2 Metode Pengelolaan
  - 6.2.1 Penjelajahan dan survai hutan
  - 6.2.2 Risalah tempat tumbuh dan tegakan
  - 6.2.3 Tehnik Perencanaan
  - 6.2.4 Pengawasan Lapangan
  - 6.2.5 Revisi perencanaan
  - 6.2.6 Rencana Kerja untuk tujuan istimewa
  - 6.2.7 Pengendalian kegiatan Lapangan
- 6.3 Masalah dan kendala hutan
- 6.4 Agribisnis hutan
- 6.5 Masalah dan kendala dalam penanaman hutan
- 6.7 Telaah finansial
  - 6.7.1 Pembukuan dan akutansi perusahaan
  - 6.7.2 Statistik perusahaan
  - 6.7.3 Rencana jangka pendek dan pembiayaannya
- 6.8 Organisasi dan manajemen hutan
  - 6.8.1 Organisasi dan manajemen hutan nasional
  - 6.8.2 Organisasi dan Manajemen hutan di daerah (tingkat wilayah, propensi, kabupaten/kotamadya, kecamatan dan desa)
  - 6.8.3 Organisasi dan manajemen perusahaan
  - 6.8.4 Organisasi dan tata laksana kantor
  - 6.8.5 Pengelolaan dan pembinaan SDM Kehutanan
  - 6.8.6 Perencanaan, pembuatan dan pemeliharaan prasarana pengelolaan.
  - 6.8.7 Tata laksana pengangkutan, penyediaan peralatan kerja dan logistik untuk SDM Kehutanan

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## 7. HASIL HUTAN, PENGOLAHAN DAN PENGGUNAAN HASIL HUTAN

- 7.1 Struktur dan sifat-sifat kayu
- 7.2 Pengolahan kayu
- 7.3 Industri pengolahan kayu dan hasil hutan lainnya
- 7.4 Penangan Kayu Bulat dan Kayu Olahan
  - 7.4.1 Pencegahan kerusakan kayu (karena serangga, cendawan dsb)
  - 7.4.2 Pengeringan dan pengawetan Kayu
  - 7.4.3 Industri Hilir (pengolahan hingga siap pakai)
- 7.5 Pengujian Kayu Olahan
- 7.6 industri Kayu pulp
- 7.7 Ekonomi penggunaan kayu terhadap kemungkinan bahan substitusi
- 7.8 Hasil hutan Selain Kayu
  - 7.8.1 Rumput atau makan ternak Lainnya
  - 7.8.2 Bahan Pangan
  - 7.8.3 Kulit Kayu dan Gabus Kayu
  - 7.8.4 Bahan obat-obatan
  - 7.8.5 getah, latex, sirlak dsb
  - 7.8.6 Rotan, bambu dan palma

## 8. TRANSPORTASI, INDUSTRI KAYU DAN PEMASARN

- 8.1 Pemasaran Hasil Hutan dan Hasil Olahan
- 8.2 Permintaan dan suplai
- 8.3 Produksi dan harga
- 8.4 Politik perdagangan
- 8.5 Pajak produksi, pemasaran dan pemakaian
- 8.6 Akuntansi pemasaran
- 8.7 Ekonomi Transportasi
- 8.8 Pemasaran kayu olahan

## 9. SEKTOR KEHUTANAN DALAM PEMERINTAHAN NASIONAL

- 9.1 Umum
    - 9.1.1 Sejarah kehutanan Indonesia
    - 9.1.2 Asas sentralisasi, dekonsentrasi. desentralisasi dan tugas bantuan dalam pengurusan hutan.
    - 9.1.3 Peranan sektor kehutanan dalam ekonomi nasional dan regional
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- 9.1.4 Peranan Hutan dan Kehutanan pada masyarakat desa hutan
  - 9.1.5 Statistik Kehutanan
    - 9.1.5.1 Statistik umum
    - 9.1.5.2 Statistik Khusus, yaitu:
      - Luas Hutan
      - Volume Kayu dan eksploitasi di setiap wilayah hutan
  - 9.1.6 Peranan/jasa hutan pada lingkungan hidup manusia, tata air dan kesuburan tanah, pariwisata, sosial budaya dan hankam
  - 9.1.7 Interaksi Sektor Kehutanan dengan sektor-sektor lain
  - 9.2 Kebijakan dalam tata guna dan pelestarian hutan
    - 9.2.1 Tata guna hutan, tata guna wilayah, dan pembangunan wilayah
    - 9.2.2 Rencana konservasi hutan untuk pemukiman dan sektor lainnya.
    - 9.2.3 Interaksi sektor-sektor kehutanan dengan sektor: Kependudukan, pertanian dan kesejahteraan keluarga
    - 9.2.4 Hutan rakyat (di tanah Milik) dan hutan persekutuan adat
  - 9.3 Kebijakan pemilikan dan pengelolaan hutan
  - 9.4 Pemerintahan umum di sektor Kehutanan
    - 9.4.1 Peraturan perundang-undangan
    - 9.4.2 Administrasi pemerintahan di sektor kehutanan
    - 9.4.3 Perlindungan hukum hutan tanah milik
    - 9.4.4 Perlindungan hutan
    - 9.4.5 Pembinaan dan pengawasan hutan
  - 9.5 Sistem perpajakan dan pungutan di sektor kehutanan
  - 9.6 Pengaturan ketenagakerjaan kehutanan
  - 9.7 Hubungan dan kerjasama internasional
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(Sumber : Duryat, 1993)