

NO.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEVELOPMENT OF HUMAN RESOURCES
FOR
THE TROPICAL FOREST MANAGEMENT
(STRATEGY FOR THE PHILIPPINES)

JULY 1992

JAPAN OVERSEAS FORESTRY CONSULTANTS ASSOCIATION
(JOFCA)

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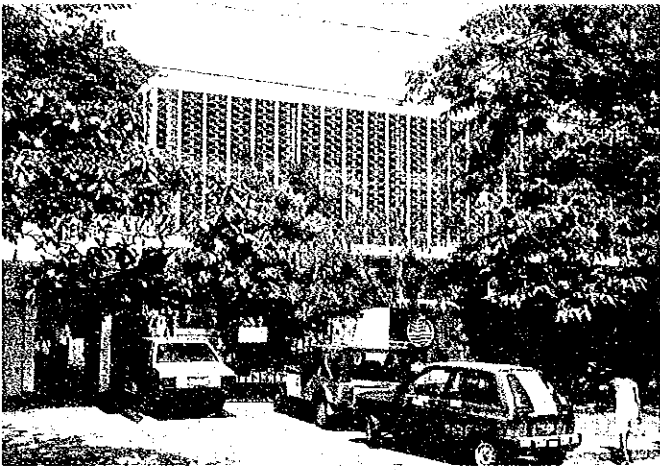
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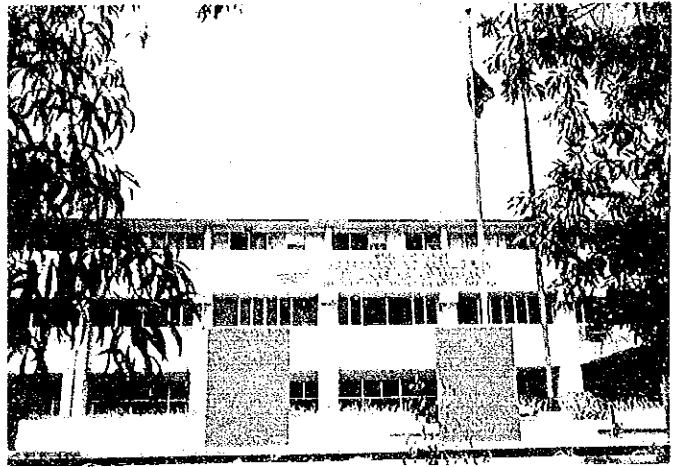
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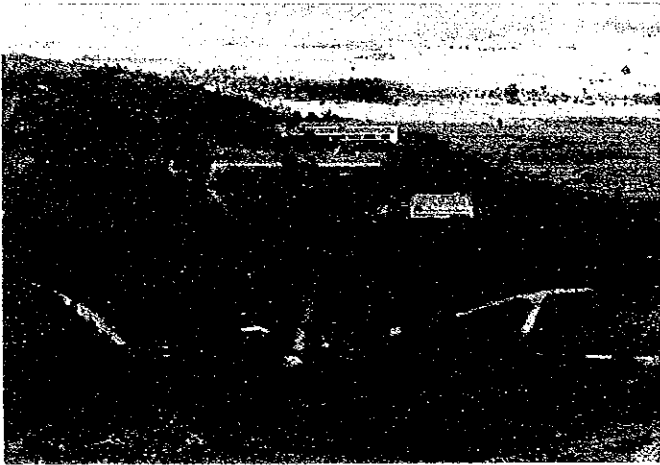
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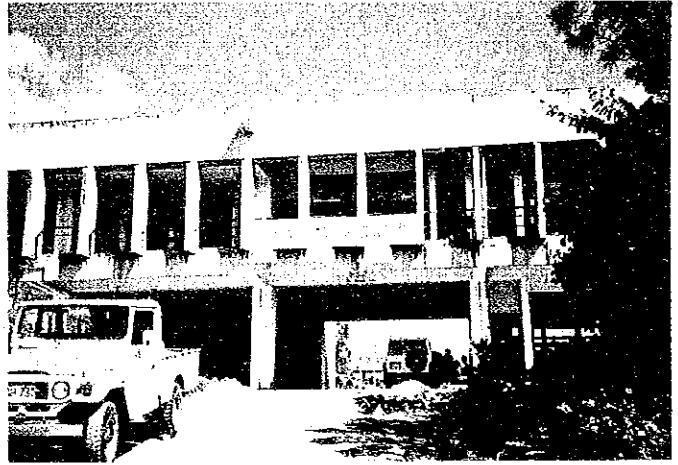
FOREST MANAGEMENT BUREAU
Department of Environment
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PHILIPPINES



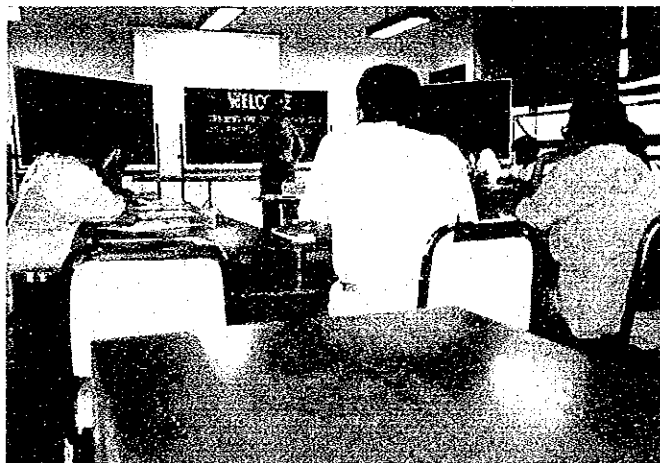
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Training Center
Panoramic view



RP-JAPAN
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Office-building



RP-JAPAN
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Classroom lesson



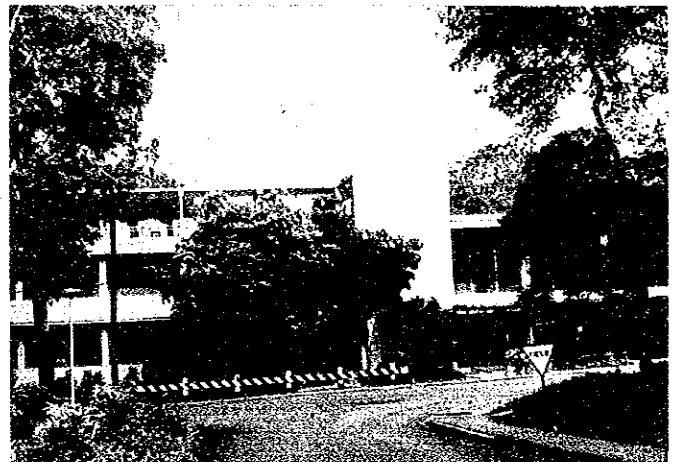
RP-JAPAN
Training Center
Dormitory

The DEAN Office, College of Forestry, UPLB



Training forest of UPLB

Building of College of Forestry, UPLB



Campus trees, UPLB

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1. Introduction

The current rapid decrease and deterioration of tropical forests are posing a grave threat to human beings, and the settlement of this problem has drawn world-wide attention.

Such a decrease in tropical forests has exerted a serious influence on the social economy of developing nations that depend on agriculture, livestock farming and forestry. In addition, the decrease has also become the subject of discussion relating to the whole world, and allows no time for delay in settlement to protect the global environment from the extinction of living species in tropical forests, global warming, and other difficulties.

In order to resolve the problem, diversified measures are required, and steps for the protection of forests and afforestation in developing nations are fundamental. However, it is an undeniable fact that in taking such steps, developing nations are short of local forestry officials, qualitatively and quantitatively, for forest management and afforestation.

Based on the recognition of problems mentioned above, this study aims at preparing and proposing, by nation, guidelines and methods for training tropical-forest management officials.

The study was conducted in the Philippines in April, 1992.

2. Current Situation of Forests

The Philippines has a total area of 30 million hectares (ha), of which 6.46 million ha is covered by forests accounting for 22% of the total (according to data from the Forest Management bureau (FMB) in 1991). Bushes are excluded from the area of forests, while natural forests occupy about 980,000 ha of the area (see Table 1). About 28% of the area of forests or 1.79 million ha is unproductive. Forests currently disappear at a rate of 80,000 ha per year. If their disappearance continues at this rate, good forests will totally disappear in eighty years.

In statistical terms, an area of 15 million ha is treated as forest land. A large part of the area seems to have recently been degraded to bushland and grassland.

As the persons concerned know well, the unsuccessful agrarian reform in the past resulted in rude forest exploitation by unsettled farmers on the one hand and neglect of proper management of forest resources by highland inhabitants on the other (see The DENR Handbook).

They also recognize that processing industries of forest products in this country have not been operated in a suitable way for the current situation of forests.

Table 1 Main Forest Types in the Philippines

Forest Type	Area	Proportion
Dipterocarp old growth forest	988,100	15.3
Dipterocarp residual forest	3,412,800	52.8
Pine forest	238,400	3.7
Mossy forest	1,137,400	17.6
Submarginal forest	544,200	8.4
Mangroves	139,100	2.2
	<u>6,460,600</u>	<u>100.0</u>

3. Forestry Policies

In these circumstances, the FMB has the following policies for future.

(1) Sustainable Development

Sustainable development now prevailing across the world is the most important item of the Philippine forestry policies.

There are two approaches to sustainable development: i.e., one is to prevent development from inhibiting the recovery of forests; and the other is to properly allocate resources to developers while reserving resources for the next generation.

To promote this policy, the FMB determined "The Master Plan for Forestry Development in the Philippines." Important measures described in the master plan are as follows:

- i) immediate conversion of virgin forest into protected areas;
- ii) shift of logging operations from old-growth to residual forests;
- iii) place all of our forest lands under effective management by communities, individuals, indigenous cultural communities, NGO's, and corporations;
- iv) sustainable management of logged-over forests to ensure sustainable production; and,
- v) increase in the rates of forest charges based on at least 20 percent of the FOB market value.

(2) The National Forestation Program

The national forestation program will cover (a) critically denuded watersheds, (b) protected areas, (c) open forests, and (d) denuded forests.

Forestation systems include (a) reforestation, (b) watershed rehabilitation, (c) management of natural forests, (d) industrial tree planting, (3) agroforestry, (f) timber stand improvement (TSI), and (g) enrichment planting.

(3) Forest Protection

Illegal exploitation and subsequently repeated shifting cultivation and live-stock farming are the target for attack in the Philippine forest protection.

To prevent such operations, they are reinforcing patrol and surveillance by forest guards and officers. A deficiency of personnel required for forest surveillance is made up by armed forces.

(4) Inventory

The purpose of any inventory is to grasp the current distribution of forest resources existing throughout the Philippines. Based on the results, a national land use plan, an investment plan and other necessary plans will be determined.

(5) Integrated Protected Area System (IPAS)

The Integrated Protected Area System (IPAS) will be introduced in order to improve administrative and managerial efficiency and consistency in national parks, sanctuaries and conservation areas. This system is also effective in securing biological diversity.

(6) Land Classification and Evaluation

Land classification and evaluation are designed to separate protected forests from land released for agriculture and various projects. Forest areas will be subdivided in several groups so that places required for agroforestry, grazing, pasture, national parks and fishponds can be defined.

(7) Integrated Social Forestry Program

The integrated social forestry program will provide the security of tenure to shifting cultivators. Qualified persons are also granted the security of tenure by a long-term management contract. This program will also give a chance to make a living by agroforestry.

(8) Community Forestry Program (CFP)

This program will use a cutting system which will promote labor-intensive harvesting and processing.

Instead concessions conventionally granted to large enterprises, community forest leases will enable forest communities to perform logging operations on a small scale.

4. Organization of Forest Management

Based on the foregoing "Current Situation of Forests" and "Forestry Policies", we shall explain the organization of forest management in the following.

Forests in the Philippines are almost state-owned, and administered by the Department of Environment and National Resources (DENR).

The DENR is largely divided into (1) central offices (including affiliates) and (2) regional offices. The former have about 15%, while the latter have about 85% of the total staff (around 32,000 members). The DENR Regional Offices are mainly responsible for forestry, land administration, mining, geophysics, environmental protection, wildlife protection, and ecological research. Although it is difficult to classify their staff accurately, about one quarter of the staff are assigned to forestry. The staff of forestry are in charge of forestry development, and forest management and protection.

Fourteen Regional Offices are located in identified administrative centers in all the regions nationwide as follows:

a.	NCR	Quezon City (National Capital Region)
b.	Region 1	San Fernando, La Union
c.	Region 2	Tuguegarao, Cagayan
d.	Region 3	San Fernando, Pampanga
e.	Region 4	Quezon City
f.	Region 5	Legaspi City
g.	Region 6	Iloilo City
h.	Region 7	Cebu City
i.	Region 8	Tacloban City
j.	Region 9	Zamboanga City
k.	Region 10	Cagayan de Oro City
l.	Region 11	Davao City
m.	Region 12	Cotabato City
n.	CAR	Baguio City (Cordillera Autonomous Region)

An organization chart of these offices and the number of their staffs are shown in Fig. 1 and Table 2, respectively.

Forests in the Philippines are administered by 14 Regional Offices, 73 PENROs⁽¹⁾, and 173 CENROs⁽²⁾. As already mentioned, the DENR has a staff of about 32,000, and local agencies including Regional Offices have a total staff of about 27,000, of which around 7,000 are in charge of forestry. Judging from the area of forests, the number of 7,000 is reasonable.

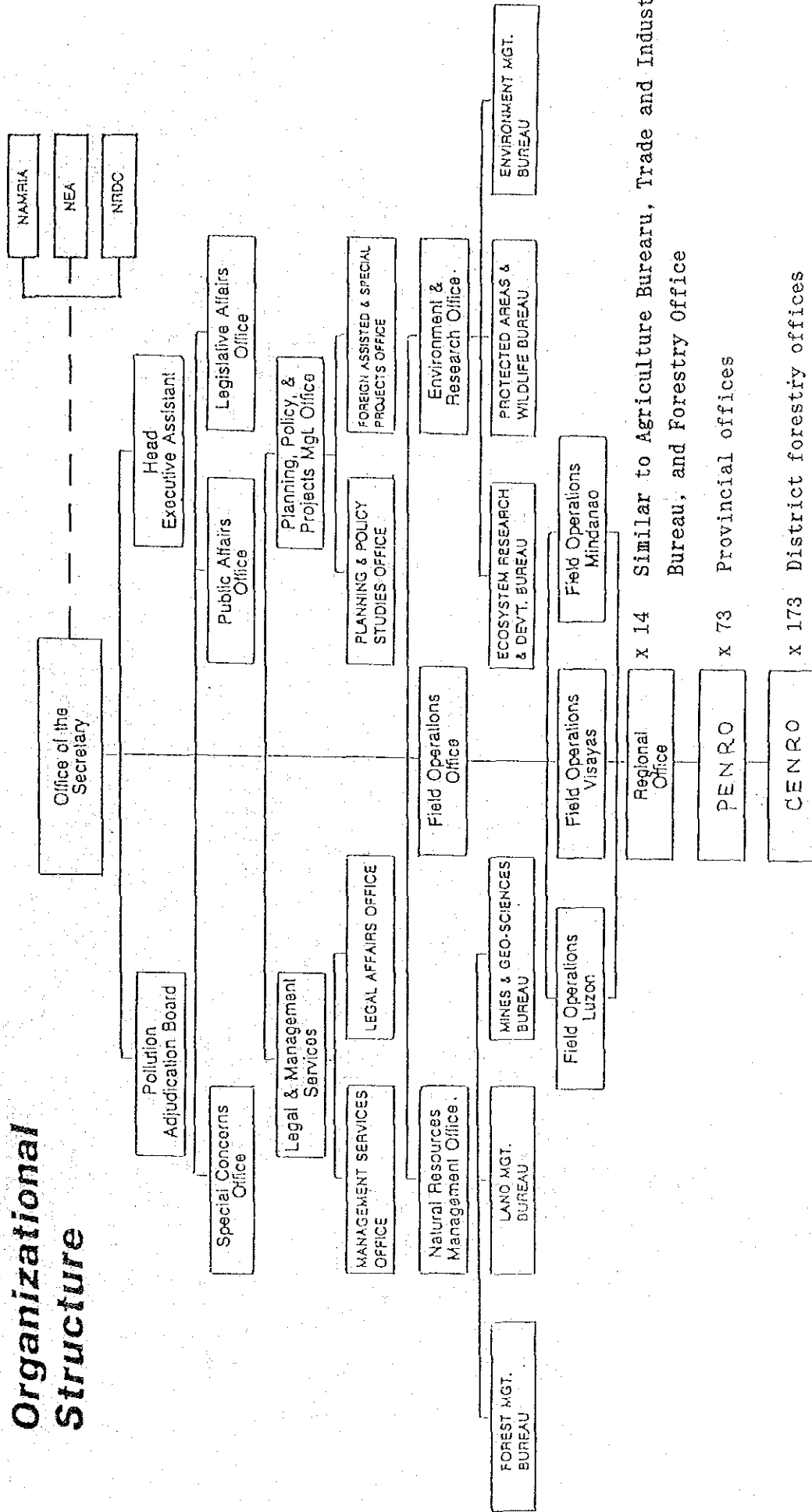
Regional offices are affiliated to the Environment & Natural Resources Office, and supervise PENROs and CENROs to administer land use plans and mines.

Note 1: Provincial Environment & Natural Resources Office. The province is a state in American terms, and its head is a governor. There are 73 provinces across the country.

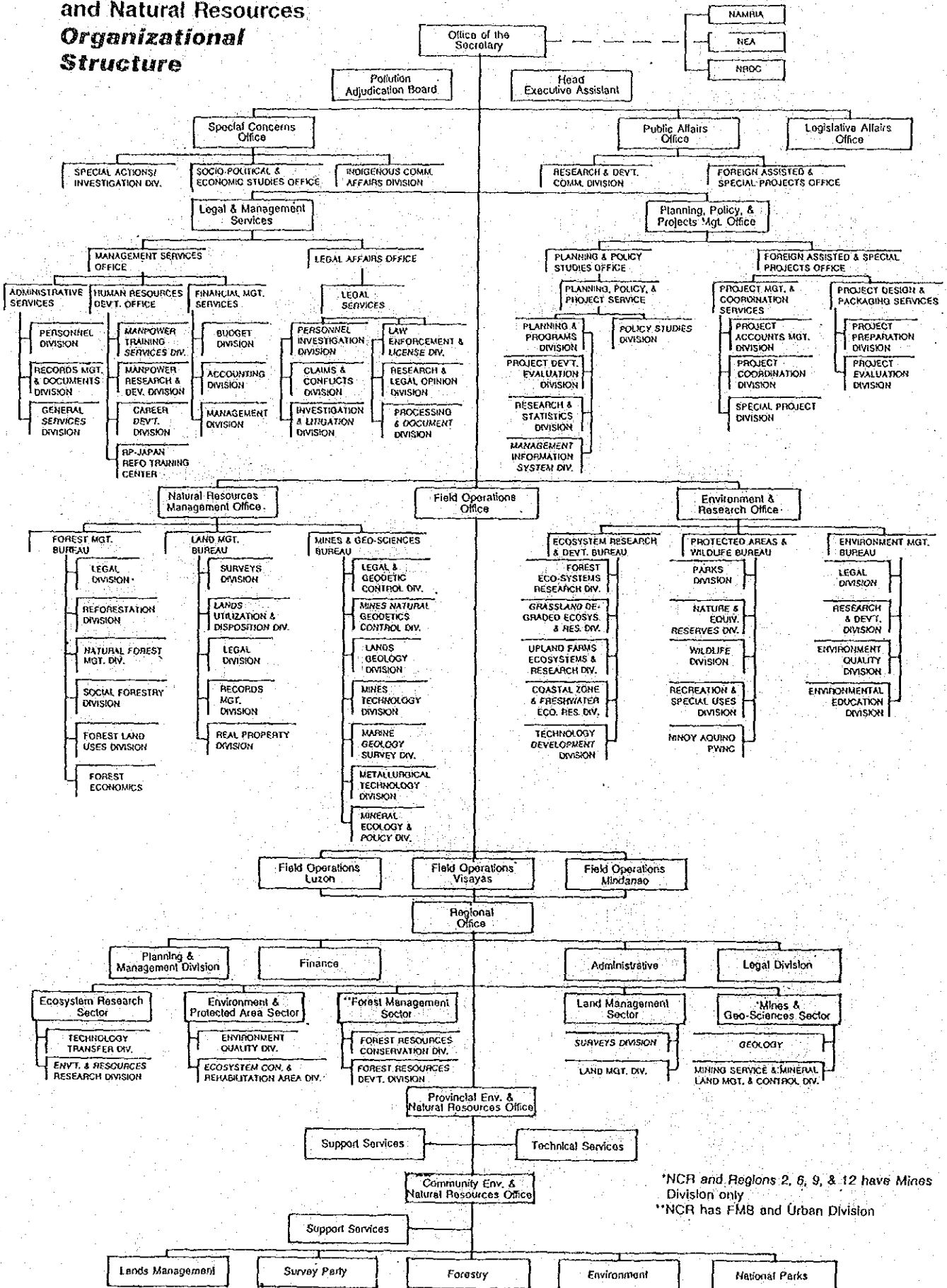
Note 2: Community Environment & Natural Resources Office. There are a total of over 1,500 municipalities under the province. CENROs are located in some of them.

Fig. 1

Department of Environment and Natural Resources Organizational Structure



(Reference)
**Department of Environment
 and Natural Resources**
**Organizational
 Structure**



*NCR and Regions 2, 6, 9, & 12 have Mines Division only
 **NCR has FMB and Urban Division

Table 2 No. of Employees in the Department of Environment and National Resources (as of March 31, 1992)

OFFICE	No. of Employees by Category				TOTAL, all categories
	Permanent	Coterminous	Contract	Casual	
CENTRAL OFFICES					
Secretary	771	39	418	129	1,357
Environmental Management Bureau (EMB)	153	15	15	18	201
Ecosystems Research and Development Bureau (ERDB)	243	5	0	139	387
Forest Management Bureau (FMB)	238	23	30	99	390
Lands Management Bureau (LMB)	286	59	5	104	454
Mines and Geo-Sciences Bureau (MGSB)	273	66	89	0	428
Parks and Wildlife Bureau (PAWB)	157	16	6	256	435
National Mapping and Resource Information Agency (NAMRIA)	795	18	49	57	919
Natural Resources Development Corporation (NRDC)	57	0	33	0	90
National Electrification Administration (NEA)	129	0	1	2	132
Sub-total	3,102	241	646	804	4,793
REGIONAL OFFICES					
Cordillera Autonomous Region	1,292	9	3	248	1,552
Region 1 - Northern Luzon	997	3	487	406	1,893
Region 2 - Cagayan Valley	1,680	0	13	604	2,297
Region 3 - Central Luzon	1,421	0	48	717	2,186
Region 4 - Southern Tagalog	2,727	6	106	0	2,839
National Capitol Region - Manila	625	1	0	53	679
Region 5 - Bicol	1,056	0	285	418	1,759
Region 6 - West Visayas	1,205	0	117	463	1,785
Region 7 - Central Visayas	932	6	13	2,616	3,567
Region 8 - East Visayas	1,253	0	0	313	1,566
Region 9 - Western Mindanao	1,123	0	1	350	1,474
Region 10- Northern Mindanao	1,699	0	10	232	1,941
Region 11- Southern Mindanao	1,925	0	153	106	2,184
Region 12- Central Mindanao	940	3	0	280	1,223
Sub-total	18,875	28	1,236	6,806	26,945
TOTAL	21,977	269	1,882	7,610	31,738

5. Forestry Education

There are 27 universities and junior colleges which have courses in forestry in the Philippines (Table 3). This is the largest scale in Asian countries except Japan. Of these universities/colleges, only 7 universities/colleges as shown in Table 4 have established forestry colleges, departments or sections. The University of the Philippines (UP), among other universities, has the longest history and complete system of silvicultural education in the College of Forestry. We shall briefly introduce silvicultural education in the College of Forestry to you in the following.

The College of Forestry was originally established as a forestry school under the direct jurisdiction of the Forest Management Bureau (FMB) in 1910. Subsequently in 1923, the school was incorporated as a forestry section into the College of Agriculture of the UP. In 1949 when World War II ended, the section was reorganized as the present College of Forestry. For nearly 40 years from 1910, the school was actually administered by the FMB, and the FMB director also served as principal. In 1951, however, the school became independent of the FMB and obtained autonomy. The master's and doctor's courses were set up in 1966 and 1973, respectively.

The College of Forestry currently has the following five sections.

- (1) Forest Biological Science (FBS): Forest biology in general
- (2) Forest Resources Management (FRM): Management and administration of forest resources
- (3) Silviculture and Forest Influence (SFI): Effects of silviculture and forests on the environment
- (4) Social Forestry (SF): Social forestry in general
- (5) Wood Science and Technology (WST): Basic science and processing technology regarding properties and applications of forest products.

Besides these, the Institute of Forest Conservation (IFC), the Forest Development Center (FDC), the Office of College Secretary (OCS), and the Administration Service (AS) are affiliated to this university. The UP is a leading center in Southeast Asia in terms of tropical forestry and forest industries, and recently gives weight especially to research and education concerning environmental conservation and

resources management.

The College of Forestry has a faculty of 62, of which 27 have doctor's degrees, 29 have master's degrees, and the remaining 16 have bachelor's degrees. The faculty by department are shown in Table 5. Besides them, six part-time lecturers and one exchange professor serve the university. Their business is supported by a research staff of 43 and a secretariat staff of 179.

There are one subprofessional course for forest rangers, two bachelor's courses, two master's courses and one doctor's course in forestry.

The forest ranger course is a two-year system organized to acquire technologies for nursery operations, silvicultural technique, surveying, dendro-taxonomy, timber harvesting, and wood processing and grading. The details of this course, including subjects, lectures, practice hours per week, and units by semester are shown in Table 6.

The Bachelor of Science in Forestry (BSF) is a four-year course designed to study forest flora and fauna, silviculture, forest resources management, forest environment effects, and social forestry. The curriculum for eight semesters in four years is organized as shown in Table 7.

The Bachelor of Science in Forest Product Engineering (BSFPE) is a five-year course designed to study the theoretical and practical aspects of production control and wood processing with emphasis on basic sciences such as mathematics, engineering, physics and chemistry. The curriculum is shown in Table 8.

The Master of Science in Forestry (MSF) is designed to acquire a required number of units, while encouraging students to study any subject interesting to them in their own ways of performing their abilities. This course takes two years.

The Master of Forestry (MF) is similar to MSF, but allows students to acquire some additional units.

The doctor's course provides students with subject matters of a higher level than the master's courses in forest biology, forestation, forest environment, forest resources management, and utilization of forest products so that students may deeply understand forests and enlighten themselves.

The number of graduates varies from year to year, but about 50 in the forest ranger course, about 30 in BSF, and about 10 in BSFPE. Although their employment was previously limited to some jobs, they are nowadays given more opportunities to be employed by many agencies and organizations related to environment control, highland development, remote area development planning, parks, recreational facilities, and power station development.

Plenty of jobs are provided to them by, for example, the headquarters and local agencies of the DENR as public organizations, many educational institutions, including universities, junior colleges and senior high schools which have courses in forestry, research institutes, public corporation and private companies related to forestry and forest production. Thus, conditions for employment seem to have been improved.

Any way, 27 universities across the Philippines have 1,300 students per gradè, and give them sufficient education for the number of students. Like U.S. students, all of these Philippine students do not graduate from universities, and only graduates will be qualified for foresters. Those who want to engage themselves in forestry must pass the certification test. Successful graduates are around 200 per year, though the number varies from year to year. The number will amount to 6,000 in thirty years. According to the official announcement by the Philippines, the total of graduates required is 2,000 to 2,500. The number of 6,000 is quite enough for demand.

Senior high school graduates who want to become forestry technicians are trained at a rate of 50 per year in the two-year course for forest rangers at the University of the Philippines.

Table 3 List of Colleges and Universities Offering Forestry Courses
(Arranged geographically from North to South)

Name of College/University	Location	Approx. No. of Forestry Students
1. Abra State Institute of Science and Technology	Lagangilang, Abra	30
2. Benguet State University	La Trinidad, Benguet	100
3. Ifugao State College of Agriculture and Forestry	Lamut, Ifugao	25
4. Don Mariano Marcos Memorial State University	Bacnotan, La Union	40
5. Ilocos Sur Agricultural College	Sta. Maria, Ilocos Sur	30
6. Mariano Marcos State University	Batac, Ilocos, Norte	50
7. Isabela State University	Cabagan, Isabela	40
8. Nueva Vizcaya State Institute of Technology	Bayumbong, Nueva Vizcaya	30
9. Pampanga Agricultural College	Nagalang, Pampanga	30
10. Tarlac College of Agriculture	Camiling, Tarlac	40
11. University of the Philippines at Los Banos	College, Laguna	280
12. Southern Luzon Polytechnic College	Lucban, Quezon	10
13. Gregorio Araneta University Foundation	Malabon, Metro Manila	150
14. Dr. Emilio B. Espinosa Sr. Memorial Agricultural College	Mandaon, Masbate	10
	(Sub-total)	865)

15.	West Visayan State University INCA Campera	Lambunao, Iloilo City	30
16.	West Visayan State University	La Paz, Iloilo City	20
17.	Negros Occidental Agricultural College	Kabankalan Negros Occidental	20
18.	Panay State Polytechnic College	Mambusao, Capiz	15
19.	Visayan State College of Agriculture	Baybay, Leyte	80
20.	University of Eastern Philippines	Catarman, Northern Samar	30
21.	Western Mindanao State University	Baliwasan, Zamboanga, City	20
22.	Central Mindanao State University	Musuan, Bukidnon	120
23.	Misamis University	Ozamis City	10
24.	University of Southern Philippines	Mampising, Mabini, Davao	25
25.	University of Mindanao	Davao City	40
26.	Mindanao State University	Marawi City	10
27.	Mindanao State University	Dinaig, Maguindanao	15
		(Sub-total	435)
		TOTAL	1,300

Source: Technical Panel on Agriculture Education Sub-Committee on
Forestry - Department of Education, Culture and Sports (DECS)

Table 4 A List of Universities/Colleges which Have Forestry College/Department

(1) College of Forestry Mindanao State University Marawi City	(5) College of Forestry University of the Philippines at Los Banos College, Laguna 3720
(2) College of Forestry Mariano Marcos State University Batac Ilocos Norte	(6) College of Forestry University of Mindanao Bolton Street Davao City
(3) Department of Forestry Visayas State College of Agriculture Baybay Leyte 7127	(7) College of Forestry Central Mindanao University Musuan Bukidnon 8213
(4) Department of Forestry Nueva Vizcaya State Institute of Technology Bayombong Nueva Vizcaya	

Table 5 Academic Careers of the Faculty by Department

Department	BS	Masteral	Ph.D.	Total
FBS	1	7	5	13
FRM	2	8	8	18
SFI	1	5	2	8
WST	1	3	8	12
SF	1	6	4	11
Total	6	29	27	62

Table 6 The Curriculum for the Forest Ranger Course

First Year					
1st Semester			2nd Semester		
FBS1	(Forest Botany)	3-3-4	FR12	(Forest Seed	2-6-4
FR9	(Forest Zoology)	2-3-3		Plants)	
FRM60	(Elem Forest		FR16	(Elem Forestry	
	Measurement)	3-0-3		Economics)	3-0-3
FRM90	(Technical		FR20	(Elem Forest	
	Drawing)	0-3-1		Surveying)	2-6-4
English A	(Fundamentals		SFI21	(Forest	
	of English I)	3-0-3		Nurseries)	1-6-3
	Soc Sci A		English B	(Fundamentals of	
	(Personality			English II)	3-0-3
	and Social		Mil. Sc. 12		(1.5)
	Development)	3-0-3	P.E.	(Elective)	(2.0)
Mil. Sci. 11	(1.5)				
P.E.1	(2.0)				
		17			17
Summar					
FRM65 (Forest Mensuration & Inventory) 6 units					
Second Year					
1st Semester			2nd Semester		
FR31	(Elem Forest		FR38	(Forest	
	Protection)	3-0-3		Administration)	3-0-3
FRM128	(Forest Laws &		FR42	(Logging	
	Regulations)	3-0-3		Engineering)	2-3-3
SFI20	(Elementary Silvi-		FRM100	(Introduction to	
	culture)	2-6-4		Forest Resources	
WST11	(Wood Structure &			Management)	3-0-3
	Identification)	1-6-3	SF111	(Forest	
WST92	(Forest Products)	3-0-3		Conservation)	3-0-3
Mil. Sc. 21		(1.5)	WST141	(Lumber Manufacture	
P.E.	(Elective)	(2.0)		and Grading)	2-3-3
			Social Science 100		3-0-3
		16	Mil. Sc. 22	(1.5)	
			P.E.	(Elective)	(2.0)
					18
Total of Units: 74					

Note: 3-3-3 means learning hours per week, practice hours per week, and the number of units.

Table 7 The Curriculum for the Bachelor of Science in Forestry Course

First Year			
1st Semester		2nd Semester	
Botany 1 (Intro to Plant Sci)	2-3-3	Chem 15 (Fund of Chemistry)	3-6-5
Communication I (Comm Skills)	3-0-3	Communication II (Comm Skills)	3-0-3
FORI (General Forestry)	2-0-2	FBS 4 (Tree Morphology and Taxonomy)	1-3-2
FRM 90 (Technical Drawing)	0-3-1	Math 14 (Plane Trigonometry)	3-0-3
Math 11 (College Algebra)	3-0-3	Physics I (Introductory Physics)	2-3-3
Soc Sci I (Foundation of Behavioral Sciences)	3-0-3	SF 101 (Principles & Concepts of Social Forestry)	3-0-3
Zoology I (General Zoology)	2-3-3		
CMT 11	(1.5)	CMT 12	(1.5)
P.E. 1	(2.0)	P.E. 2/3	(2.0)
	<hr/>		<hr/>
	18		19
Second Year			
1st Semester		2nd Semester	
FBS 24 (Dendrology)	1-6-3	Economics I (General Economics)	3-0-3
FBS 31 (Plant Physiology)	2-3-3	FB 336 (Fund of Forest Ecology)	2-3-3
History I (Philippine History)	3-0-3	History II (Asia & the World)	3-0-3
Humanities I (Literature, Man & Society)	3-0-3	SFI 100 (Geology of Forest Soils)	2-3-3
Math 26 (Analytic Geometry & Calculus I)	3-0-3	Wildlife 101 (Introduction to Philippine Wildlife)	2-3-3
SF 111 (Forest Conservation)	3-0-3	WST 11 (Wood Structure and Identification)	1-6-3
CMT 21	(1.5)		
P.E. 2/3	(2.0)	CMT 22	(1.5)
		P.E. 2/3	(2.0)
	<hr/>		<hr/>
	18		18

Table 7 (Continued)

Third Year			
1st Semester		2nd Semester	
Communication 111 (Speech Communication)	3-0-3	FRM 61 (Forest Biometry)	2-3-3
English 10 (Writing of Scientific Papers)	3-0-3	FRM 117 (Forest Economics)	3-0-3
FBS 26 (Intro to Forest Entom)	2-3-3	P.L. 100 (Life & Works of Rizal)	3-0-3
FRM 91 (Forest Surveying)	1-6-3	SFI 121 (Silviculture 2)	2-3-3
SFI 120 (Silviculture 1)	2-3-3	STS (Science, Tech & Society)	3-0-3
Stat 1 (Elementary Statistics)	2-3-3	Elective	3
	18		18
Summer: FOR 150 (Forestry Practicum) 6 units			
Fourth Year			
1st Semester		2nd Semester	
FBS 186 (Forest Management 1)	2-3-3	FBS 41 (Forest Pathology)	2-3-3
FRM 192 (Timber Harvesting)	2-3-3	FRM 124 (Forest Policy & Administration)	4-0-4
Soc Sci II (Social, Economic & Political Thought)	3-0-3	FRM 187 (Forest Management 2)	2-3-3
Philosophy I (Philosophical Analysis)	3-0-3	Humanities II (Art, Man and Society)	3-0-3
WST 127 (Wood Prop & Utilization)	3-3-4	SF 152 (Socio of Natural Resources)	3-0-3
Elective	3	Elective	3
	19		19
Total of Units: 153			

Table 8 The Curriculum for the Bachelor of Science In Forest Products Engineering Course

First Year			
1st Semester		2nd Semester	
Botany 1 (Intro to Plant Sci)	2-3-3	Communication II (Comm Skills)	3-0-3
Communication I (Comm Skills)	3-0-3	FBS 23 (Identification of Commercial Trees)	1-6-3
History I (Philippine History)	3-0-3	History II (Asia and the World)	3-0-3
Math 17 (College Algebra and Trigonometry)	5-0-5	Math 26 (Analytic Geometry and Calculus I)	3-0-3
Soc Sci I (Foundation of Behavioral Sciences)	3-0-3	Soc Sci II (Soc, Economic and Political Thought)	3-0-3
WST 91 (Forest Products Industries)	2-0-2	Zoology I (General Zoology)	2-3-3
CMT 11	(1.5)	CMT 12	(1.5)
P.E. 1	(2.0)	P.E. 2/3	(2.0)
	19		19
Second Year			
1st Semester		2nd Semester	
Chem 15 (Fund of Chemistry)	3-6-5	Chem 40 (Basic Organic Chemistry)	3-3-4
Humanities (Lit, Man and Society)	3-0-3	ENSC 10 (Engineering Graphics)	0-6-2
Math 27 (Analytic Geometry and Calculus II)	3-0-3	ENSC 11-a (Engineering Mechanics)	4-3-5
Physics 3 (General Physics I)	2-3-3	Math 28 (Analytic Geometry and Calculus III)	3-0-3
WST 11 (Wood Structure and Identification)	1-6-3	Physics 13 (General Physics II)	2-3-3
CMT 21	(1.5)	CMT 22	(1.5)
P.E. 2/3	(2.0)	P.E. 2/3	(2.0)
	17		17

Table 8 (Continued)

Third Year			
1st Semester		2nd Semester	
ENSC 13 (Strength of Materials)	3-0-3	Economics 11 (General Economics)	3-0-3
ENSC 14-a (Eng'g Thermo and Heat Transfer)	4-3-5	ENSC 16 (Fluid Mechanics)	3-0-3
WST 121 (Wood Physics I)	2-3-3	Philosophy I (Philosophical Analysis)	3-0-3
WST 131 (Wood Chemistry I)	2-3-3	STS (Science, Tech & Society)	3-0-3
WST 141 (Lumber Mft & Grading)	2-3-3	WST 151 (Wood Seasoning)	2-3-3
WST 161 (Wood Preservation)	2-3-3		18
	17		
Fourth Year			
1st Semester		2nd Semester	
Communication III (Speech Communication)	3-0-3	FRM 192 (Timber Harvesting)	2-3-3
ENSC 18 (materials of Engineering)	2-3-3	WST 124 (Timber Mechanics)	2-3-3
FRM 92 (Forest Engineering)	1-6-3	WST 132 (Pulp & Paper Technology)	3-0-3
Humanities II (Art, Man and Society)	3-0-3	WST 132.1 (Pulp and Paper Lab)	0-6-2
MGT 101 (Concepts & Dynamics of Management)	3-0-3	WST 144 (Wood Machining I)	2-3-3
Statistics I (Elementary Statistics)	2-3-3	WST 172 (Glued Wood Products Technology)	2-3-3
		Elective	3
			20
	18		
Fifth Year			
1st Semester		2nd Semester	
ENG 10 (Writ of Sci Paper)	3-0-3	ENSC 90 (Engineering Ethics)	1-0-1
ENSC 19 (Basic Elec Eng'g)	3-0-3	WST 140 (Env'l Pollution for Industry)	3-0-3
P.I. 100 (Life & Works of Rizal)	3-0-3	WST 181 (Quality Control)	2-3-3
WST 125 (Wooden Structures)	3-0-3	WST 182 (Prod Planning & Control)	2-3-3
WST 190 (Research Problem)	0-6-2	WST 183 (Eng'g Eco Analysis)	3-0-3
Elective	6	WST 199	1
	20	Elective	3
			17
Total of Units ... 181			

6. Training of Forestry Technicians

The foregoing College of Forestry of the University of the Philippines has research facilities as well as educational facilities. Besides these facilities, an independent forestry laboratory and an independent research institute of forest production are also located on the large campus. These institutes are mainly responsible for research, but also accept trainees from outside. Only a few cases of training are, however, carried out in a regular and systematic way. We could not obtain official records or reports regarding them.

On the other hand, the DENR has carried out training of people engaged in forestry in a systematic way. In particular, the RP-Japan Training Center carried out training on the largest scale as part of the RP-Japan Pantabangan Project for Technical Cooperation in Forestry Development. In the following, its training will be outlined.

(1) Organization and Achievements of the RP-Japan Training Center

This center is organized as shown in Fig. 2. It consists of a main building (a large lecture room, a small lecture room, an office, an instructors' room, a meeting room, a drawing room, a library, a laboratory, etc.) and a residential building (a room holding 40 trainees, a dining room, a kitchen, a guest room, a staff's room, etc.). Besides these buildings, a garage, a workshop and a power house are installed.

More mining facilities were completed for training in March, 1980 on the basin of Bayabas (96 ha) in Toban about 8 km of the Center.

Training comprises general and advanced courses. Main subjects include general basic knowledge and applied technology. The curricula of these courses are shown in Table 9.

Training courses in Phases I (1982 - 1987) and II (1988 - 1991) are listed in Table 10.

From this experience, the following points should be taken into consideration in the future.

In Japanese experts' opinion, the FMB technical staff, including foresters and senior foresters generally have a fairly high level of knowledge, but many of them are not good at applying technology to their business in a practical and systematic way. Therefore, training programs have been developed to overcome this weak point. Training should continuously aim at practical applications of technology without overemphasizing theories and lectures.

Importance should be especially attached to field practice, the use of experimental tools, and learning by using actual data.

Although it has so far depended on part-time lecturers from universities, the Center should increasingly entrust lectures to the FMB technical staff in the future.

(2) Other Training

The DENR also gives basic education and training to regional officers and Barangai captains as minimum administrative units in forestry and environmental problems about forests by request as well as general administration. This kind of activity is assigned to the Manpower Training Service Division.

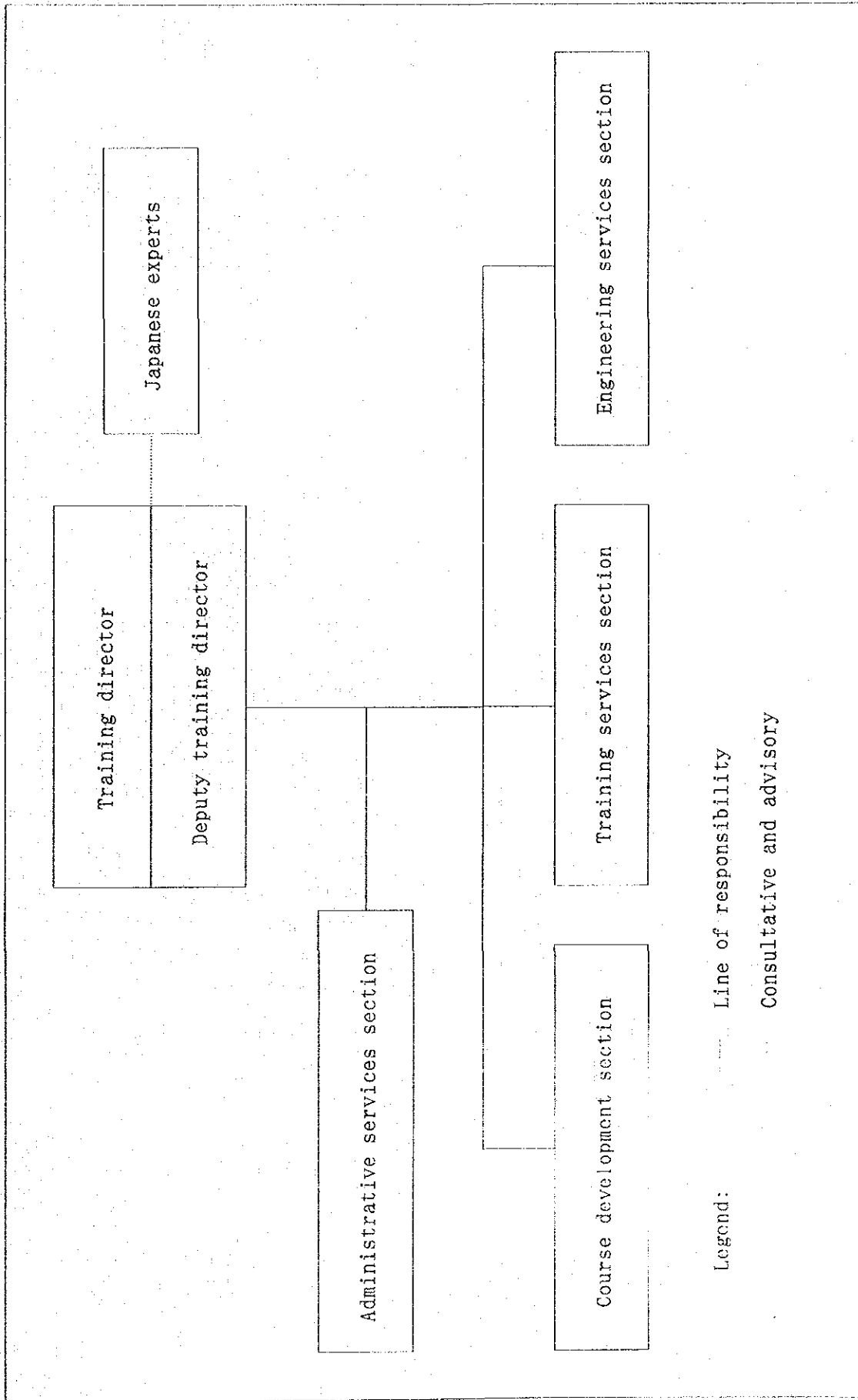


Fig. 2 An Organization Chart of the RP-Japan Training Center

Table 9 Details of Training by Course

(1) General Course

Course	Purpose	Trainee	Period	Content
Leading Forest Ranger	To train leaders in protecting forests by giving knowledge & technology	5 years or more experienced foresters	2 & half to 3 months	<ol style="list-style-type: none"> 1. Basic technology to protect forests 2. Planning & designing approaches to forest protection work 3. Execution technology to protect forests
Leading Silvicultural Technician	To train leaders in afforestation by giving basic knowledge & technology	3 years or more experienced foresters (25 - 30)	2 & half to 3 months	<ol style="list-style-type: none"> 1. Planning afforestation projects 2. Technology to systematize nursery & planting works 3. Technology to design and manage forest roads 4. Technology to apply machines 5. Technology to prevent fires and damages by diseases, insects & bad weathers 6. Technology for nursery and planting 7. Technology to construct forest roads 8. Operating and maintaining machines 9. Technology to protect forests
Machine Operator	To train heavy machine operators for forest earth works	Senior high school graduates with an experience of 1 year or more (5 persons)	1 month	<ol style="list-style-type: none"> 1. Knowledge to operate & maintain machines 2. Technology to operate & maintain machines 3. Field practice

(2) Advanced Course

Course	Purpose	Trainee	Period	Content
Forest Ranger	To train instructors in protecting forests by giving advanced knowledge & technology	Those who completed the general course (5)	8 months	<ol style="list-style-type: none">1. Expertise in forest protection2. Carrying out a study on forest protection and submit a paper3. Planning, designing & execution
Advanced General Training	To improve leaders in forestry management through general training for forest management & system control	Directors of forestry offices or equivalents (20)	3 weeks	<ol style="list-style-type: none">1. Expertise in forest management2. Methods for administering & managing business3. Case study

Table 10 Achievements of the RP-Japan Training Center

Year	Course	Period	Trainees
PHASE I			
1982	Silviculture/Reforestation Planning	May 24 - August 11	23
	Soil Erosion Control/Watershed Management	Oct. 1 - November 30	24
1983	Silviculture/Reforestation Planning	Feb. 2 - March 31	25
		Oct. 3 - December 1	25
	Soil Erosion Control	May 17 - July 28	24
1984	Soil Erosion Control/Watershed Management	Feb. 1 - March 31	24
		Oct. 15 - December 13	24
	Silviculture/Reforestation Planning	July 16 - September 20	23
1985	Soil Erosion Control/Watershed Management	Oct. 14 - December 12	22
	Silviculture/Reforestation Planning	July 29 - October 3	23
	Heavy Equipment Operation Course	March 4 - March 29	5
	Senior Course on Forest Conservation (Trainer's Training)	Jan. 24 - July 10	4
	General Senior Course	June 10 - July 10	21
1986	Soil Erosion Control/Watershed Management	Feb. 10 - April 17	25
	Silviculture/Reforestation Planning	July 14 - September 24	24
1987	Forest Conservation/Watershed Management	Feb. 9 - April 10	27
	On-the-Job Training on Erosion Control for FAP's	May 13 - August 23	10
	General Senior Course	May 13 - August 23	18

Table 10 (Continued)

Year	Course	Period	Trainees
PHASE II			
1988	Soil Erosion Control/Watershed Management	April 11 - July 3	24
	Silviculture/Reforestation Planning	July 11 - September 15	26
1989	Erosion Control/Reforestation Planning	Aug. 1 - October 6	21
	Soil Erosion Control/Watershed Management	Oct. 16 - December 8	21
1990	Social Forestry	Jan. 22 - March 15	25
	Reforestation Planning	July 31 - October 5	20
	Watershed Management	Oct. 15 - December 7	25
1991	Social Forestry	Jan. 23 - March 14	25
	Reforestation Planning	July 23 - September 27	25
	Watershed Management *(On-going)	Oct. 14 - December 11	22

7. Proposals

(1) Problems about Forests and Forestry

As mentioned in the first section, forests in the Philippines cover an area of 6.46 million ha, accounting for 22% of the total area of the nation. Of them, natural forests occupy 970,000 ha, and must be protected by all means.

Nevertheless, forests are currently reduced at a rate of 80,000 ha per year. As far as the present situation continues, they will totally disappear in no distant future. The most urgent need for the Philippine forestry is sustainable management.

Sustainable management could be achieved by combining the following measures.

- i) Preventing forests from disappearing
- ii) Expanding man-made forests
- iii) Improved utilization of forest products

These measures will be examined in detail.

i) Preventing Forests from Disappearing

The disappearance of forests is caused by the repeated combinations of illegal cutting, forest conversion to or firing for agriculture and live-stock farming, and forest fires. In turn, it causes not only environmental deterioration, frequent occurrence of natural disasters, and a reduction in the supply of resources, but also the devastation of national land and difficulty in continuing agriculture and live-stock farming as exemplified by Sudan and Egypt in Africa.

Possible countermeasures are:

- a. Enlightening and educating local inhabitants and the general public;
- b. Requesting the persons engaged in forestry to cooperate in preventing illegal cutting;
- c. Requesting cooperation for fire prevention and organizing and training a fire brigade; and

- d. Defining and operating completely land ownership and tenure systems.

ii) Expanding Man-made Forests

Because necessary silvicultural technique is in most cases available, some other considerations will be noted in the following.

- a. Investing a wide range of private funds should be considered. Because incentives such as related taxes are needed, successful cases in other countries should be reviewed.
- b. Farmers should be widely encouraged to plant trees. For this purpose, the supply of seedlings, the agroforestry approach, and the security of tenure should be examined.
- c. A large-scale planting system should be examined by establishing a public corporation for afforestation.
- d. Success in afforestation depends on site condition. An appropriate site selection method should be considered.
- e. Afforestation projects in themselves are infrastructure. So, an appropriate way of procuring necessary funds should be considered.

iii) Improved Utilization of Forest Products

Valuable forest products should be prudently utilized. Effective measures for this purpose will be introduced in the following.

- a. Improvement in timber harvesting techniques, especially the improvement of bucking efficiency and product value should be considered.
- b. Technical guidance in improving processing efficiency should be given.
- c. Preservation and insect control should be used to extend the durable years of products.
- d. The extensive use of efficient furnaces and stoves should be promoted to utilize fuelwood.
- e. Paper recycling should be promoted.

The first two factors could be achieved if the quality, attitudes and enthusiasm of the staff are improved by on-the-job training and study meeting.

Although the RP-Japan Training Center will soon complete its role in the JICA project, we hope that the center will continue to be used for various purposes in the future. It is recommended that the persons engaged in forestry should actively participate in training in Japan and in any third country.

Since it is never easy for us to prevent forest from being destroyed and achieve sustainable management, we consider it the best way of attaining our goal to attempt intensive management by selecting appropriate regions, provinces or communities. Comprehensive training will be required for intensive management.

(2) Problems for Educational and Training Institutions

Educational and training institutions for forestry in this country are recognized as being relatively good in terms of system and content in Southeast Asia. There are 27 universities and colleges giving silvicultural education across the country, several times as many as in other countries. Research institutions corresponding to forestry laboratories are organized by the system of headquarters and branches in the Philippines like Japan. The headquarters at Los Banios in Laguna near Manila have the control over branches throughout the country, which carry out regionally important researches. Forestry is well organized and systematically administered mainly by the DENR, which has trained its staff on its own.

These institutions positively tackle problems of forest protection, afforestation and environmental conservation in their respective ways. They are, however, mainly oriented by vertical discipline rather than horizontal liaison. In the writer's experience, for example, it seems that cooperation with universities and research institutions has not positively been promoted in the RP-Japan

Pandabanga Project, and the cumulative results of their researches have not substantially been utilized in the project. This seems to reflect a kind of jurisdictional rivalry. We consider that this situation should be improved.

Another problem in the Philippine forestry and forest management is the disturbance of public order due to turmoils between the government and an anti-governmental organization. The College of Forestry of the University of the Philippines and forestry laboratories and research institutions have established a number of test plots throughout the country, which have continued long-term observation. In the 1980s, these remote plots became unaccessible for the reason of security, and many of them are now left unattended. Local agencies of the FMB, especially forestry offices on the islands of Mindanao and Mindoro are also threatened by a similar trend. The current situation seems to partially inhibit steady progress in forest management and afforestation despite plenty of technicians and researches and the well-established administrative system in the Philippines.

JICA