JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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

NOVEMBER 1993

JAPAN OVERSEAS FORESTRY CONSULTANTS ASSOCIATION (JOFCA)

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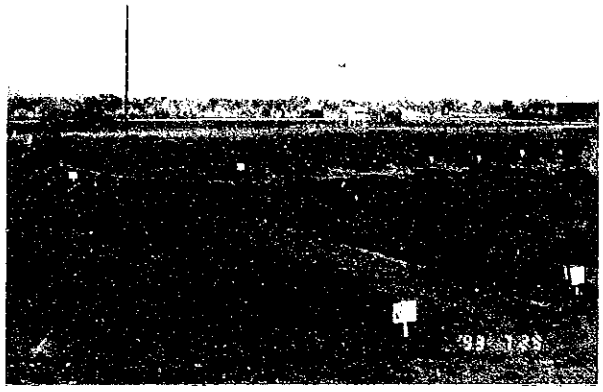
1. A Meeting at FBD



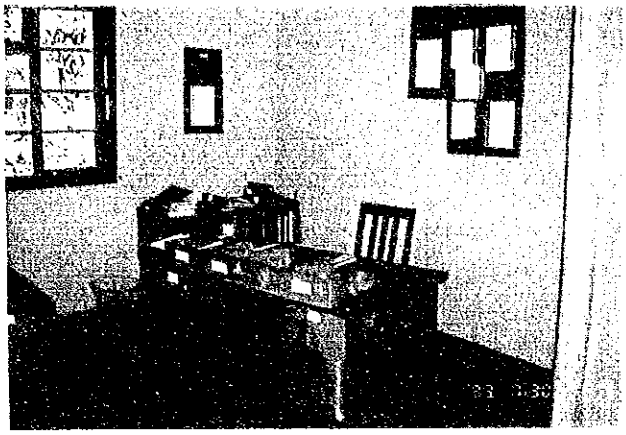
2. The Nursery of JICA Village Forestry Project

3. Forest Industries Training Institute in Moshi, Kilimanjaro

4. TAFORI in Morogoro

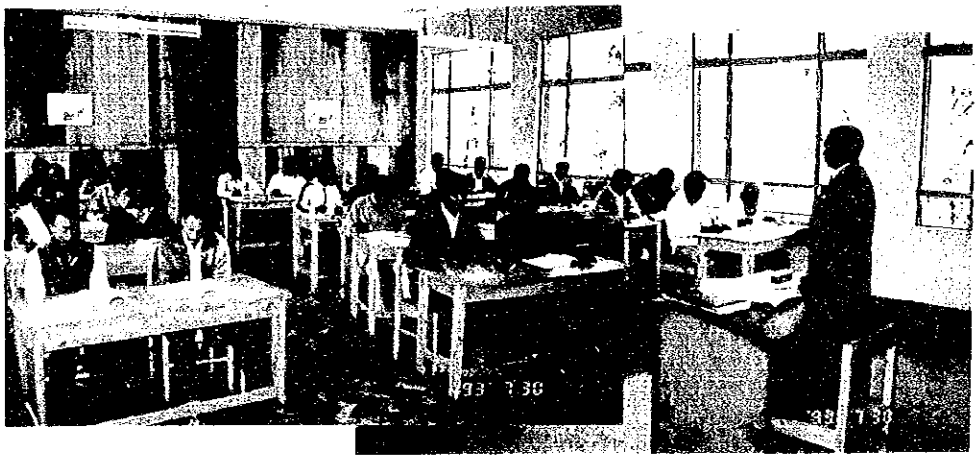
5. Faculty of Forestry, Sokoine University in Morogoro

6. Department of Wood Utilization, Faculty of Forestry, Sokoine University



7. A Lecturers Room

8. The Library



9. A Class–room Lesson

10. A Nursery
(7–10 Olmotonyi Forestry Training Institute)

11. A Meeting at CDA (Dar es Salaam)

Contents

1. Introduction 1

2. Current Situation of Forests 2

3. National Forestry Policies 5

4. Organization of Forest Management and Conservation 8

   (1) Forestry and Beekeeping Division (FBD) 8
   (2) Capital Development Authorities (CDA) 11
   (3) Tanzania Forestry Research Institute (TAFORI) 12

5. Forestry Education 26

   (1) University Education 26
   (2) College Education 29
   (3) Tanzania Kilimanjaro Village Forestry Project 34

6. Proposals 35

   (1) Basic Circumstances 35
   (2) Necessary Consideration for Forestry Policies 38
   (3) Possible Direction of the Manpower Development 41

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 Tanzania in July and August, 1993.

2. Current Situation of Forests

It is reported that the territory of Tanzania extends over 88.6 million ha, of which 44 million ha is covered with forests and woodland. In fact, however, forests are decreasing at a rapid rate, and their actual area may be lower than the above-mentioned figure.

Forests can be classified by a different method as follows:

Type of Forest	(in 1000 ha)
Forests (other than mangrove forests)	1400
Mangrove forests	80
Woodland	42891
Use of Forest Land	
Productive forests	34626
Unproductive forests	9745
Legal Status	
Forest reserves (National forests)	13024
Forests/woodlands within national parks, etc.	2000
Public forest land	29347

Forests and woodlands include plantations with an area of about 150,000 ha (80,000 ha within reserves), which account for 0.3% of the total area of forests.

Most forest reserves are intended for production, while some are protected (mainly watershed forests). Public forests have gradually been transferred to the management of local governments.

Regional areas and national forests by region are shown in Table 1 and 2, respectively.

Table 1 The Area by the Region

Region	Area in Sq. Km	% Total
ARUSHA	82,429	8.8
COAST	32,428	3.4
DARESSALAAM	1,121	0.1
DODOMA	41,300	4.4
IRINGA	56,949	6.1
KAGERA	28,750	3.1
KIGOMA	45,066	4.8
KILIMANJARO	13,209	1.4
LINDI	67,000	7.1
MARA	21,790	2.3
MBEYA	60,000	6.3
MOROGORO	73,039	7.8
MTWARA	16,726	1.8
MWANZA	35,192	3.7
RUKWA	68,635	7.3
RUVUMA	64,233	6.8
SHINYANGA	50,764	5.4
SINGIDA	49,341	5.2
TABORA	76,120	8.1
TANGA	27,102	2.9
TOTAL	940,000	100

Source: Bureau of Statistics

Table 2 The Area of National Forests by Region

Region	Area in Hectares		Total
	Productive	Protective	
ARUSHA	189.5	242,779.1	242,968.6
COAST	242,417.9	43,880.0	286,497.9
DODOMA	57,689.0	132,737.5	190,426.5
IRINGA	65,346.7	355,364.5	420,711.2
KAGERA	162,678.2	144,613.9	307,292.1
KIGOMA	838,958.7	3,626.1	842,587.9
KILIMANJARO	7,279.0	133,279.1	140,558.1
LINDI	523,808.9	65,795.2	589,604.1
MARA	152.2	1,581.0	1,733.2
MBEYA	299,511.3	119,211.8	418,723.1
MOROGORO	1,099,335.5	272,173.1	1,371,508.6
MTWARA	51,623.5	6,245.9	57,869.4
MWANZA	132,549.8	4,676.3	142,845.4
RUKWA	2,784,998.3	18,228.9	2,803,227.2
RUVUMA	485,570.6	153,013.5	638,584.1
SHINYANGA	782,819.0	5,236.4	788,055.4
SINGIDA	785,263.6	0.0	785,263.6
TABORA	2,565,338.8	1,396,321.2	3,961,660.0
TANGA	59,421.4	85,166.7	144,588.1
TOTAL	10,944,950.9	3,183,930.2	14,128,882.1

3. National Forestry Policies

In this section, the national forestry policies of Tanzania will be outlined in reference to Tanzania's Action Plan for Forests presented in 1989 by the Ministry of Lands, Natural Resources and Tourism.

The purpose of the forestry policies is to improve the function of forests in order to maintain the sustainability of national resources. By doing this, the government intends to eliminate barriers to foodstuff security (agricultural and livestock products).

The final goals of forest administration have been determined as follows:

i) The support of forestry to agriculture and livestock development and to the preservation of land production potential should be maximized through soil and water conservation, crop and livestock shelter, food from trees, fodder production, etc.

ii) A maximum feasible level of self-sufficiency and export growth in forest-based products and services will be targeted considering both for market and subsistence consumption. This implies production increase in wood and non-wood products directly contributing to socio-economic development, notably GDP, employment and income.

iii) Efficiency in generating forest-based products and services will be raised. This implies better utilization of productive capacity and higher productivity in the use of all production factors, including land, labour and capital.

iv) Natural ecosystems and genetic resources should be adequately conserved for the benefit of future generations. Tanzania's forests and woodlands possess a unique richness in this respect.

v) Within the above mentioned goals, the contribution of forestry and beekeeping to the fiscal balance of the Government will be enhanced. The sector can potentially earn more revenues than its public expenditure requirements are.

To achieve these goals, the following strategic guidelines were presented.

i) Agriculture, livestock and forestry should be developed jointly where trees and forests should be considered an essential part of production systems contributing to soil and water conservation and meeting local demands for forest products. This development should aim at contributing to local self-reliance applying approaches derived from the needs of the people. Sustainable land husbandry would require the promotion of agroforestry, planting fodder, fruit and nitrogen-fixing trees, hedgerows, windbreaks, trees along boundaries, roadsides, irrigation canals, etc.

ii) Tenurial rights have to be established for all land being used and the remaining public land should be brought under the management and control of the Government. Land-use planning should be strengthened on village level in particular.

iii) People should be recognized as the main actors of development, not only as a target group. Their participation, particularly that of women and the rural poor, has to be ensured in the development of forest-based activities through increased awareness of rights and production possibilities. The emphasis should be on provision of benefits and economic incentives to people rather than increasing control. Large-scale mobilization of people's participation has to make use of both formal and informal means of organization. Major strengthening of the extension service is necessary to mobilize people for tree growing.

iv) The role of the private sector will be decisive in future industrial development and other productive activities; the institutional framework should be adjusted to ensure forthcoming investment. Adequate control has to be established with increasing participation of the private sector in productive activities both in forest management and utilization as well as in processing and marketing.

v) Conservation efforts will be successful only if natural resources are rationally utilized. The participation of local people in conservation of ecosystems and genetic resources is essential.

vi) Maximization of the sector's economic contribution will equally consider wood and non-wood products and services derived from forests as well as trees growing outside forests.

vii) Economic efficiency will be sought both in production and demand management, the latter will be particularly important in case of biomass energy. Prices of forest products should reflect their true value to the society.

viii) The chosen technical solutions must be simple with minimum external (imported) inputs but also reflecting the relative scarcity of locally available production factors (energy, labour, capital, etc.).

ix) As no blueprint exists, development efforts have to fit the local conditions. The roles of central and local governments should be clearly defined in each case to make such efforts effective.

Based on the foregoing action plan, Tanzania's forestry policies and organizations to implement them are currently being reviewed. This work is substantially supported by funds and technical assistance from Finland (FINNIDA).

4. Organization of Forest Mangement and Conservation

(1) Forestry and Beekeeping Division (FBD)

Tanzania's forest administration is carried by organizations working in parallel. The authority equivalent to Japan's Forestry Agency is the Forestry Department of the FBD, the Ministry of Lands, Natural Resources and Tourism. Besides these, there are local agencies of the Prime Minister's Office and those of the Ministry of Local Administration, Village Development, Cooperatives and Markets (Fig. 1). The central government, as the largest owner of forests in the country, has the final say in implementing its forestry policies. However, there are numerous issues concerning specific administration and management because different organizations exist in parallel as mentioned above. This creates the problem of integrated forest administration. It is important that the reform plan recently be proposed as shown in Fig. 2 is carried out.

The positioning of the staff in the Forestry Department is shown in Table 3 according to job rank. Tables 4 and 5 show their positions in local headquarters and the positions of district staff, respectively.

The educational backgrounds and qualifications of the staff of the Department are shown in the following. Bachelors, masters and doctors obtained their respective qualifications at Sokoine University of Agriculture and other universities. Other staff qualified in forestry training institutes.

Doctors	23
Masters	65
Bachelors	269
Diploma holders	319
Certificate holders	602

The Forestry Department recognizes a Forest Officer or higher posts as professional staffs, Assistant Forest Officer or higher posts as technical staffs, and Forest Assistant and Attendant as technicians.

A bachelor's or master's degree or higher is required for Forest Officer or higher posts, while a diploma or a certificate is required for Assistant Forest Officer and other technical staffs. Some forest officers hold only diplomas, but they have long and varied experience in this field. Technical staffs require some basic knowledge of forestry.

Although secondary and advanced secondary education is required for professional and technical staffs, primary education is required for technicians.

During this study, the study team could survey project agencies affiliated with the Department. The projects, human resources and present situation will be outlined in the following.

1) Arusha Catchment Forestry

This project is designed to protect natural forests and focuses on forest conservation, catchment management and soil conservation. The project covers the natural forest zone which covers about 26,000 ha at the foot of Mt. Meru.

The routine includes:

a. Preventing forest fires;
b. Discouraging inhabitants from invading forests;
c. Monitoring the theft of good-quality, hardwood trees; and
d. Monitoring the behavior of illegal beekeepers (because smoke used to disperse bees may lead to fire).

To facilitate monitoring, fast-growing species are planted as a buffer along the forest boundary.

If an open space exists within the forest, it will be covered with domestic species, Cordia, Croton, Ficus, Olea and Pterocarpus.

This project is managed by a staff of 70. They include two bachelors, eight diploma holders and 27 certificate holders. The other staff have received no technical education.

Seedlings are produced for the above-mentioned planting of indigenous species.

2) Mt. Meru Forest Plantation Project

This project, as one of several projects for planting trees in seventeen state-owned forests, has been implemented in the forest area at the foot of Mt. Meru.

The plantation will be managed on the following principles.

a. To the satisfaction of the forest and Beekeeping Division (FBD) Policy regarding afforestation in Tanzania.

b. To tend the existing plantations so as to maintain good stands for the production of good quality timber.

c. To utilize the wood resources as it becomes available in regulated and economic manner.

d. To manage the plantations in a sustained yield of wood for the current and the future by replanting clearfelled compartments immediately.

e. To take protective measures against soil erosion and improve vegetation cover for better water catchment regulation.

This area exists at an altitude of 1500 to 2600 m and has a rainfall of 700 to 1600 mm over two rainy seasons. It has fertile soil and constantly-flowing rivers.

Ficus, Entandrophragma, Eckebergia, Albizia and Syzygium are indigenous species which existed before forestation. Juniperus and Hyjenia are also found at higher altitides.

The present species include:
Cupressus lustanica
Eucalyptus Maidenii
Olea capense
Grevillea robusta

Pinus patula

The plantation has an area of about 8000 ha.

This project has the organization shown in Fig. 3 with a staff of 100. Those who received special education include one master, one bachelor, seven diploma holders and eight certificate holders.

The budget is tight, and only wages are paid by the government, while costs of all other projects are covered by timber sales.

Locals are employed for operations within the forest, and the produced timber is supplied as a raw material to local timber industries. Thus, the project makes a contribution to improvement of the local economy.

(2) Capital Development Authorities (CDA)

This corporation was established with the intention of improving the environment of Dodoma, as the proposed future capital of the country, and is now one of the divisions of the Ministry of Works. It has a staff of 700, which, however, will be reduced to 380 in the future. Forestry-related divisions belong to the Department of Engineering & Environment Management. In this connection, eight members of the Japan Overseas Cooperation Volunteers Team have cooperated with this division and have been engaged in planting operations in Dodoma.

The position classification in this organization is as follows:

1. Chief Forestry Officer
2. Senior Forestry Officer
3. Forestry Officer
4. Assistant Forestry Officer
5. Senior Technical Assistant
6. Technical Assistant
7. Foreman
8. Attendant and Guard

Position 1 is occupied by those with a master's degree, while positions 2 and 3 are occupied by bachelors. Positions 4, 5 and 6 are occupied by diploma or certificate holders with experience. Primary and secondary school graduates are assigned to positions 7 and 8. As a result, the Department of Horticulture and Conservation of this organization has one master, three bachelors, three diploma holders and six certificate holders. The other members of the staff have not received forestry education or training.

In the vicinity of Dodoma, people did not make it a habbit to plant trees until recently. However, awareness activities have made them aware of the usefulness of timber and they actively participate in forestation. This has facilitated economic and environmental improvement.

A summary of CDA's organization is shown in Fig. 4, and the organization of forest-related divisions is shown in Fig. 5. Although its office is located in Dar es Salaam, the present capital, the main force of the organization is based in Dodoma. Members of the Japan Overseas Cooperation Volunteers Team have participated in planting operations and worked towards their goals in Dodoma.

(3) Tanzania Forestry Research Institute (TAFORI)

Before the abolition of the East Africa Community, forest research had been conducted mainly by the East Africa Agricultural and Forestry Research Organization in Muguga in Kenya, and its branches existed in East African countries. Subsequently, each of these countries set up its own research institute, and the Tanzania Forestry Research Institute was established in 1980.

The objectives of the institute are:

1. Develop research expertise, facilities and the appropriate environment to respond to the forestry research needs of Tanzania.

2. Facilitate rapid adoption, adaptation and diffusion of forestry technologies into Tanzania.

3. Promote the understanding of traditional practices and take a lead in the development and propagation of viable indigenous forestry technologies.

4. Enhance efficient and environmentally conscious development, management and utilization of forest resources.

5. Build a wealth of knowledge in forestry which can contribute to global forestry development.

6. Through support to the national forestry development plan, uplift the contribution of forestry to the GNP, and particularly assist economically disadvantaged communities.

The general purpose of forest research is to contribute to the socioeconomic development of the nation and to improve the living standard of the poor in economically underdeveloped areas.

The organization of the institute is shown in Fig. 6 and Table 6. As shown in the figure, this institute is managed by a board of directors in a semiofficial manner. Most of the operating costs must be borne by the institute although staff salaries and some operating costs are paid through the Forestry Department. Therefore, the management of the institute is in a difficult situation.

Qualifications which researchers in each department have obtained are shown below. (Dr stands for doctor, M for master, B for bachelor, D for diploma holder and C for certificate holder.)

Director General	Master
Forest Production Research	
Director	Master
Forest Ecology	Dr 1, M 3, B 1, D 7, C 6
Forest Management	M 3, B 2, D 5, C 5
Tree Genetics	B 3, D 3

Forest Protection	B 2, C 1

Forest Utilization

Director	Master
Wood Structure	M 1, B 1, D 3
Timber Engineering	M 1, D 2
Forest Operations	M 1, D 1, C 1
Wood Energy	B 1, C 2
Wood Chemistry	Vacant

It is planned that the institute receive substantial assistance for its facilities and management from Finland (FINNIDA). However, this plan is currently suspended because the economic circumstances in Finland have worsened. If this plan is carried out, the function of the institute will be markedly improved.

The headquarters of the institute is located in Morogoro. Additionally, the following seven research centers are located in ecologically typical areas.

Dodoma Arid Zone Afforestation Research Center

Research in development of silvicultural techniques in areas with a rainfall of 600 mm or less, technologies for agriculture, forestry and stock raising, and soil conservation.

Kibaha Lowland Afforestation Research Center

Development of silvicultural techniques in coastal lowlands.

Lushot Silvicultural Research Center

Development of regeneration techniques in highlands, creation and maintenance techniques of plantation forests, and agroforestry techniques in highlands.

Malya Lake Zone Afforestation Research Center

Research on agro-silvo-pastoral technologies and soil conservation.

Moshi Timber Utilization Research Center

Research in timber utilization.

Mufindi Pulpwood Research Center

Research, development and application of pulp and paper, establishment and maintenance techniques of industrial plantations, and hydrology of forest plantations and natural forests.

Tabora Miombo Woodland Research Center

Cooperation in research on regeneration of Miombo Forest, silvicultural techniques suitable for Miombo Forest, and research on agro-silvo-pastoral technologies.

In this study, the study team visited Moshi Timber Utilization Research Center.

Moshi Timber Utilization Research Center

This center is located in the center of Moshi City, adjoining the Timber Industries' Training Institute and TWICO (Tanzania Wood Industry Corporation) Plant. Thus, it is surrounded by a good research environment. The organization in this center carries out research in forest utilization as shown in Fig. 6 and Table 6. The equipment is not well maintained because the lack of funds is more serious in this center than in any other division. The center has a staff of 50 members, including four researchers and thirteen technical members. The remaining members are assistants. The director of the laboratory obtained a master's degree, researchers are bachelors, and technical members hold diplomas or certificates.

Insufficient budgeting has thwarted research activities. However, the Section of Wood Energy launched a one-year joint project, which is the only ongoing activity.

For reference, the Protection Division was transferred from Lushot Silvicultural Research Center, and now actively carries out research projects to control harmful aphids against cypress by using natural enemies. Damage by aphids also creates a problem in Kenya, and requires a worldwide research project.

Table 3 Forestry Staff under the FBD

Staff Designation/ Rank / Unit	Director	Principal Forest Officer	Principal Assistant Forest Officer	Senior Forest Officer	Senior Assistant Forest Officer	Forest Officer	Assistant Forest Officer	Forest Assistant Attendant
1. FBD Headquarters	1	-	-	9	1	17	70	26
2. Forestry Training	-	-	-	3	-	13	12	23
3. Forest Projects								
a. Catchment Forestry					1	9	90	207
b. Teak					1	13	6	95
c. Plantation			1	1	1	10	50	319
d. Zonal Forest Managem.		1	1		1	11	42	232
e. Land Reclamation				1		10	60	179
f. Others		1	1	2	1	13	66	504
4. Forestry in B/K						5		
Total	1	2	3	16	6	101	396	1,585

Table 4 Forest Staff at Regional Headquarters

Region \ Staff Rank	Principal Assistant Forest Officer	Senior Forest Officer	Senior Assistant Forest Officer	Forest Officer	Assistant Forest Officer	Forest Assistant/ Attendant
Ruvuma			1	2	17	41
Shinyanga	1				9	33
Kagera		1		2	6	18
Mwanza		1	1		4	9
Arusha		2			2	9
Singida		1			14	30
Morogoro				1	2	
Kilimanjaro		1			7	2
Tabora			1	2	8	28
Kigoma				3	5	2
Dar es Salaam					10	
Rukwa					8	
Iringa				3	17	
Mbeya	1			2	8	
Mara				1	6	
Pwani				1	2	20
Lindi		1		1	3	1
				4	10	
Total	3	7	3	22	138	193

Table 5 Forest Staff in Regional Districts

Staff Designation/ Rank / District Staff in Regions	Senior Assistant Forest Officer	Forest Officer	Assistant Forest Officer	Forest Assistant/ Attendant
Ruvuma		1	14	32
Shinyanga		6	11	96
Kagera		2	10	64
Mwanza		4	18	33
Arusha	1	2	34	95
Singida		1	16	59
Morogoro		2	32	
Kilimanjaro		3	5	3
Tabora		3	17	18
Kigoma	1	2	16	54
Dar es Salaam		3		
Rukawa		4	9	16
Iringa		2	16	36
Mbeya		1	24	
Mara	1	1	17	53
Pwani		1	7	4
Lindi			23	28
Dodoma (CDA) not applic.			20	
Mtwara not applicable			15	
Tanga not applicable			30	
Total	3	38	334	591

Table 6 Organization of TAFORI Directorates

Directorate	Department	Sections
Forest Production	Forest Ecology	Soil and Climate Botany and Herbarium Indigenous Forests
	Forest Management	Industrial Plantation Arid Zone Afforestation Community Forestry Agroforestry Forest Economics Forest Mensuration
	Tree Genetics (Tree Improvement)	Tree Breeding Seed Nurseries
	Forest Protection	Forest Pathology Forest Entomology Fire Protection
Forest Utilization	Wood Structure	Wood Anatomy Strength Testing Seasoning Wood preservation
	Timber Engineering	Sawmilling Wood Working Panel Boards Manufacturer
	Wood Energy	Firewood and Charcoal Production Cooking Stoves
	Wood Chemistry	Extractives Pulp and Paper Manufacture
	Forest Operations	Forest Roads Logging
Finance and Administration	Finance	Accounts Stores
	Personnel and Administration	Personnel Management and General Administration

Fig. 1 Public Forest Administration

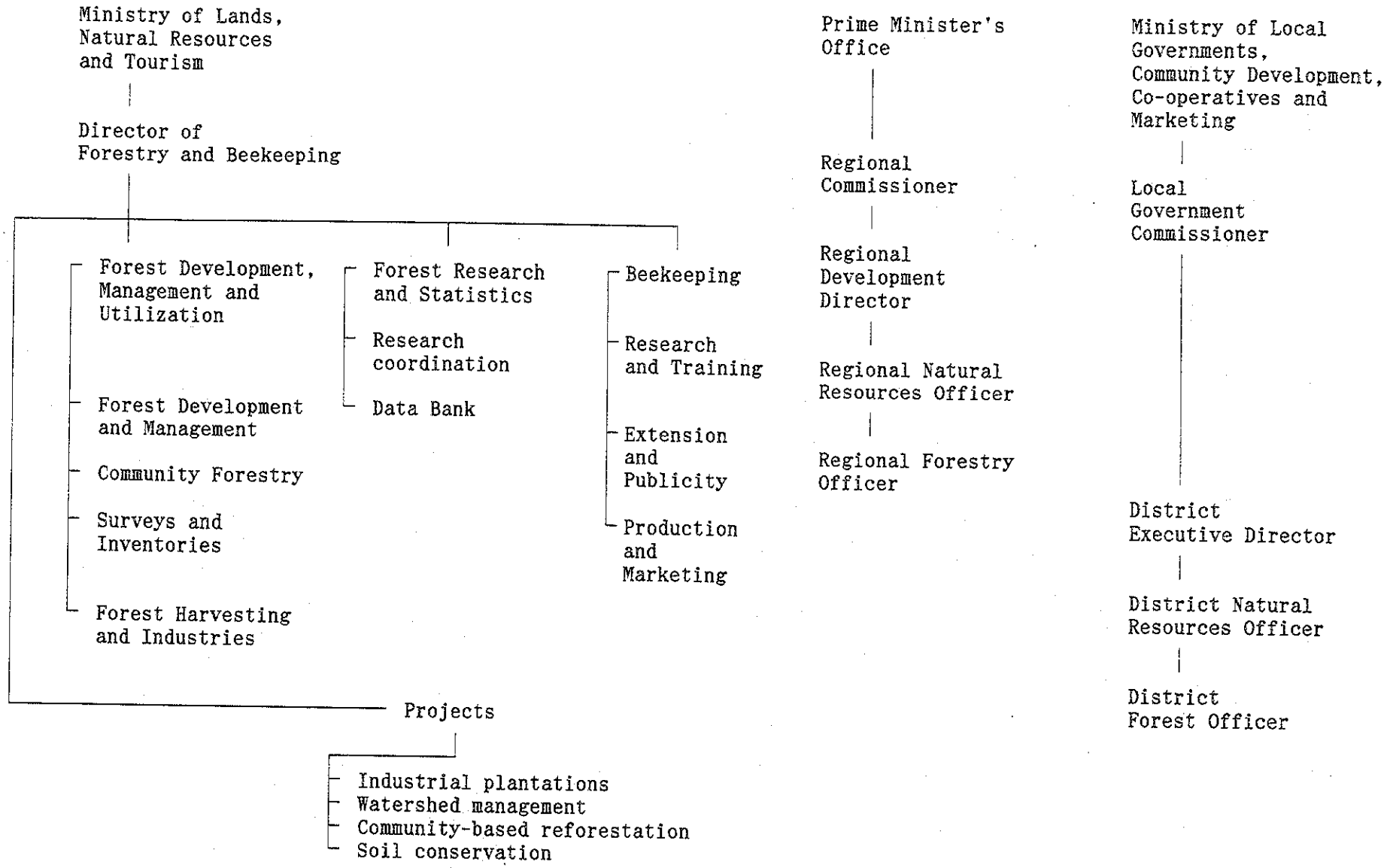


Fig. 2 Proposed Organogram for the Forestry Division

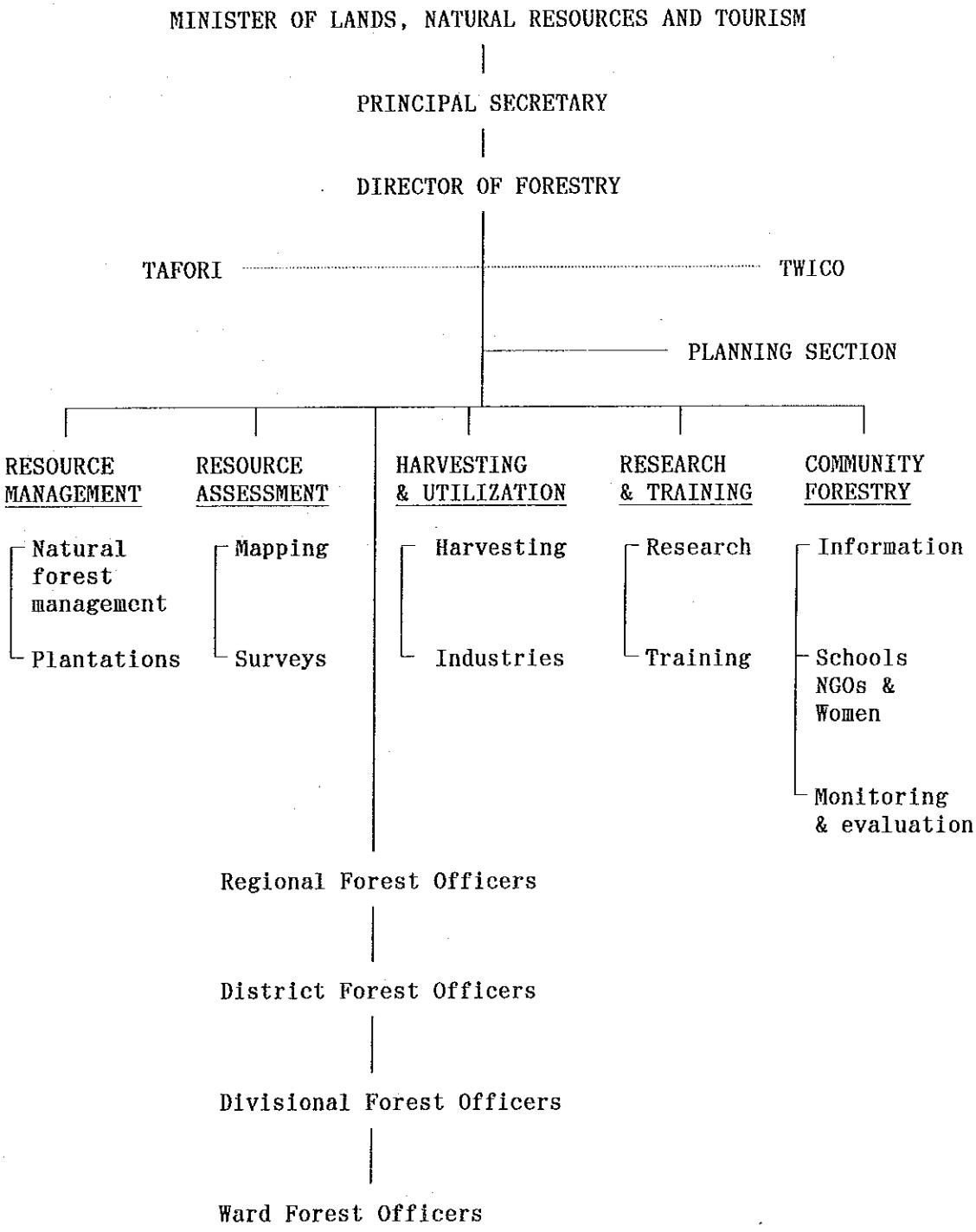


Fig. 3 The Organization of Mt. Meru Forest Plantation Project

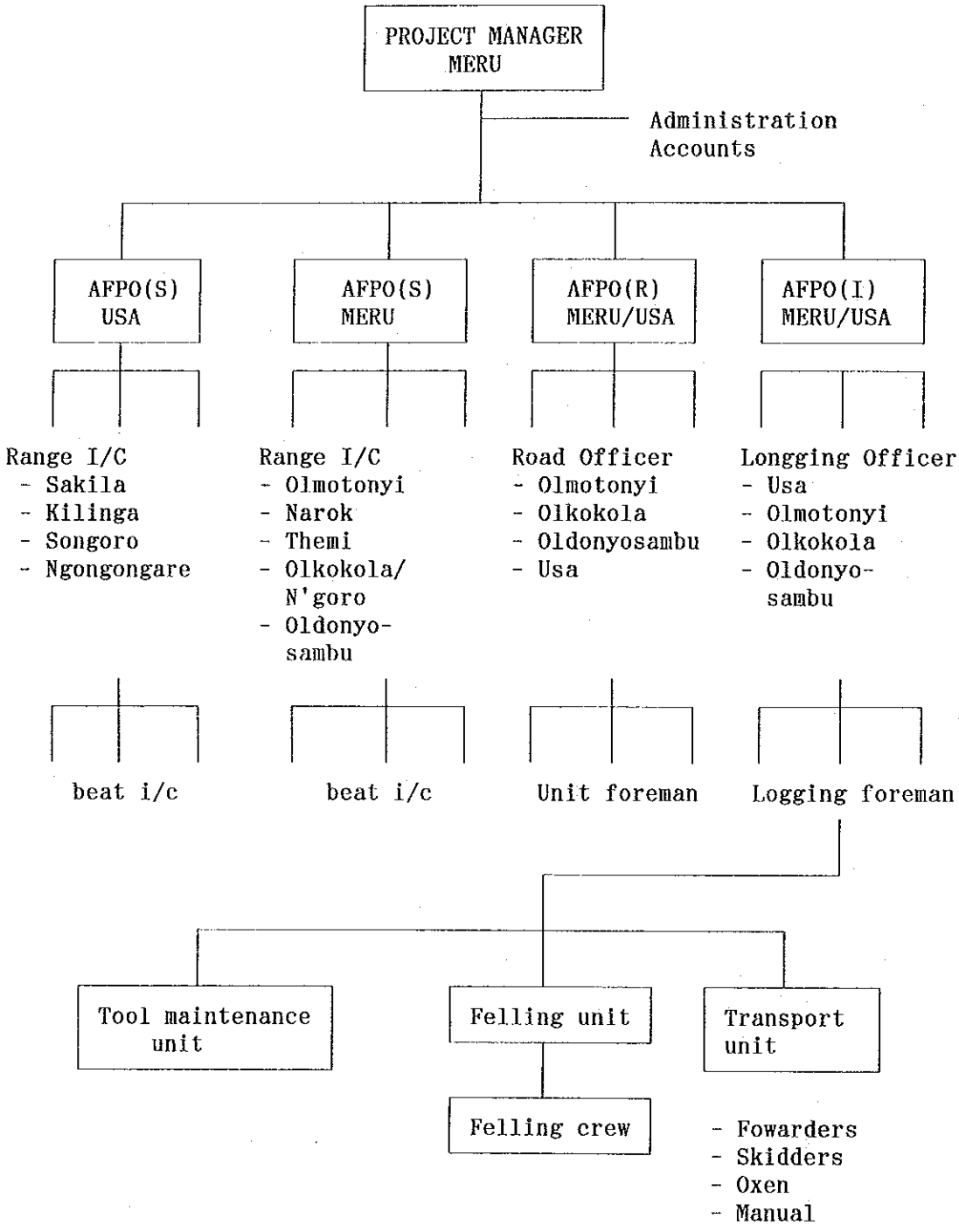


Fig. 4 The Organization Chart of CDA (1)

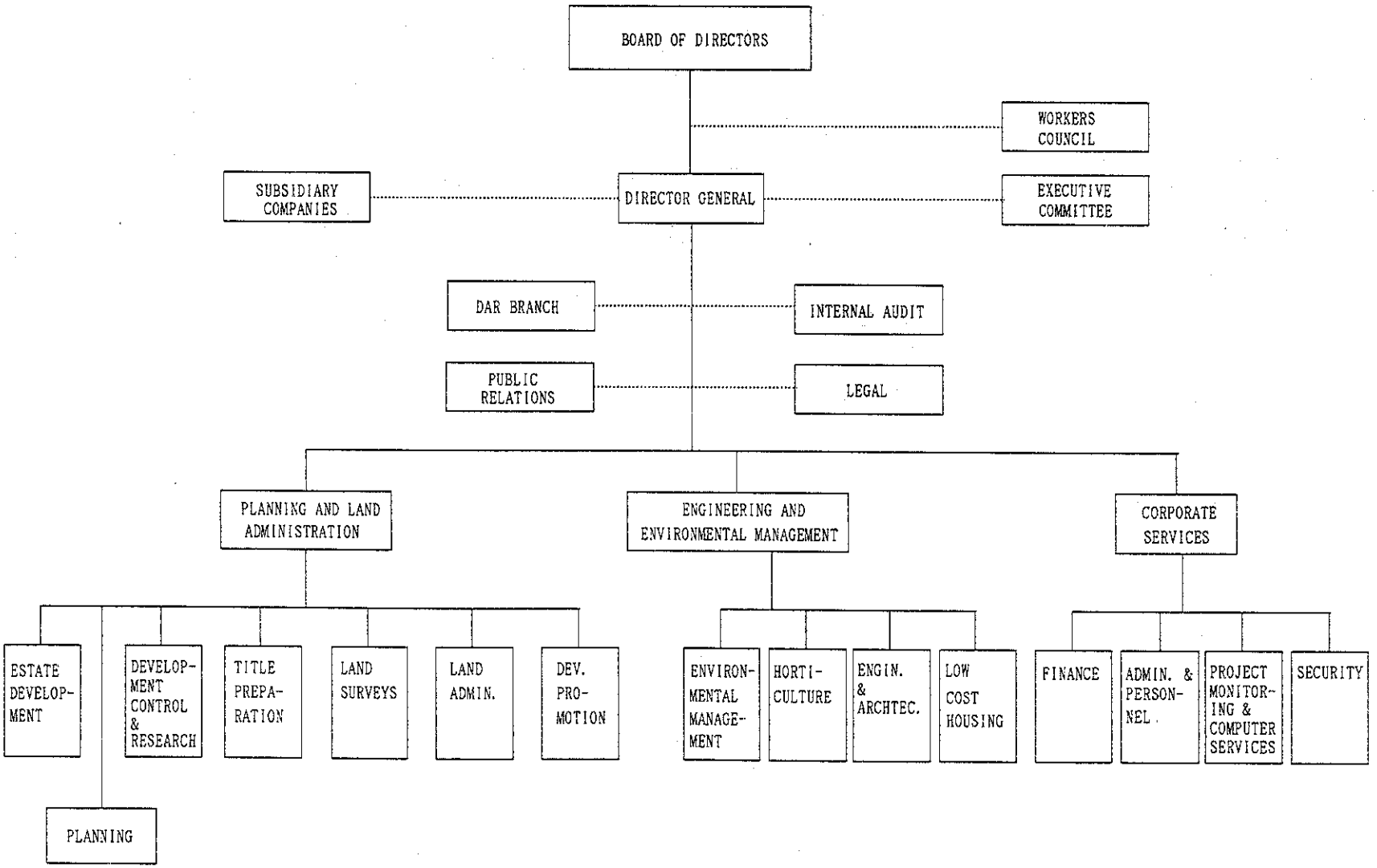


Fig.5 Department of Engineering and Environmental Management

The Organization Chart of CDA (2)

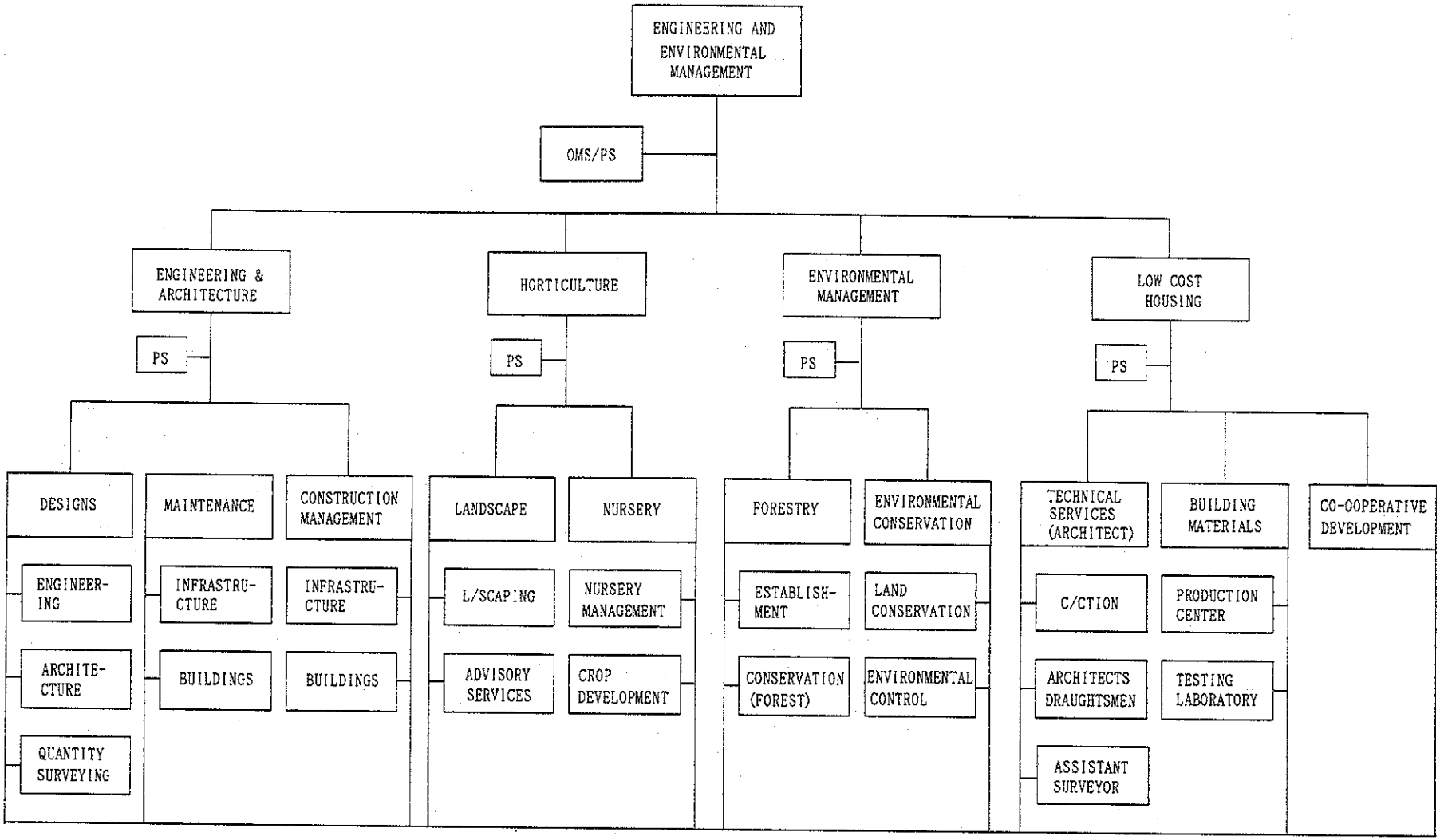
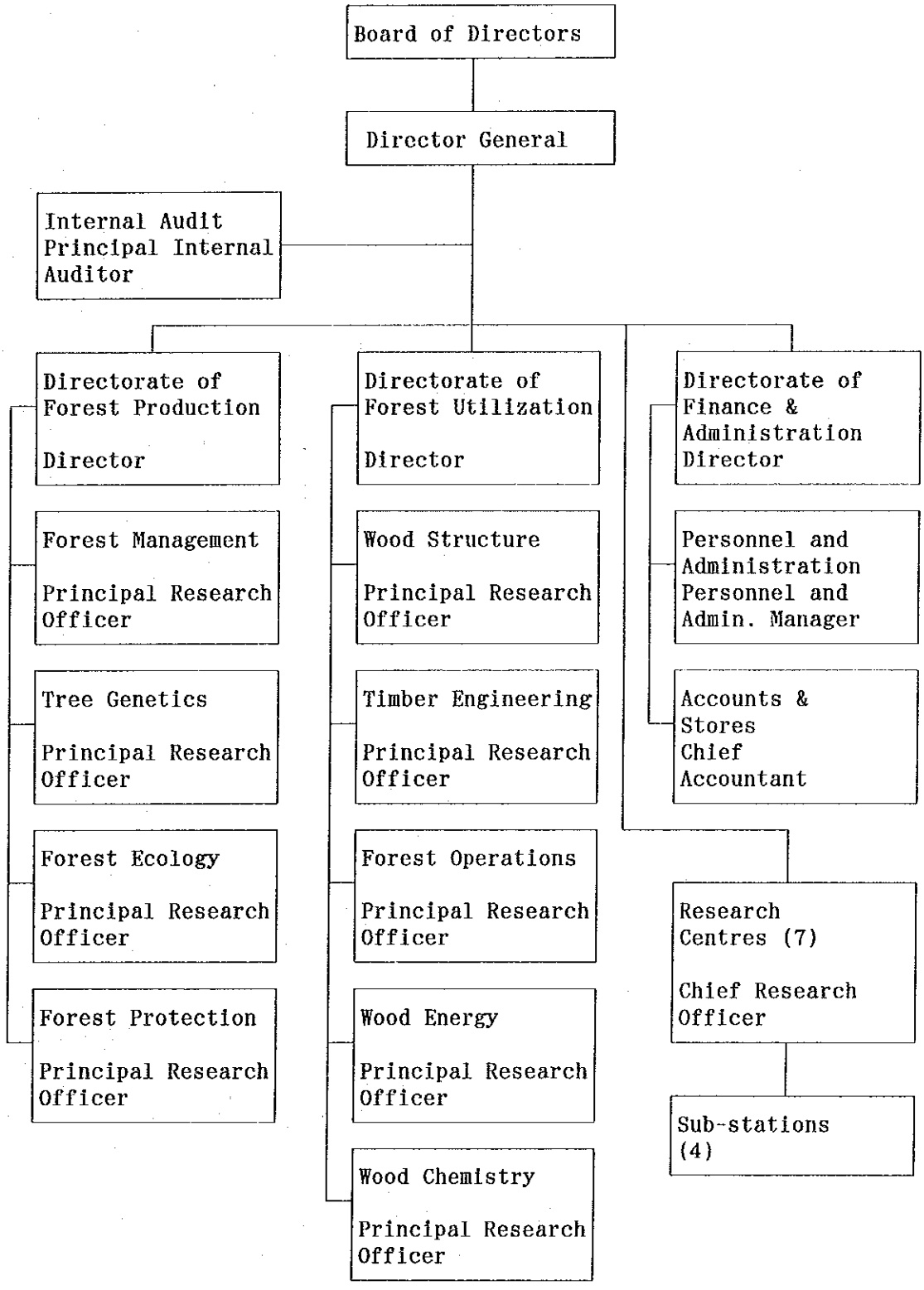


Fig. 6 Tanzania Forestry Research Institute's Organogram



5. Forestry Education

(1) University Education

First of all, the education system in Tanzania will be described.

Primary School: 7 years, graduates called Standard 7
Secondary School: 4 years, graduates called Form IV
Advanced Secondary School: 2 years, graduates called From VI

Graduates who have good school records can go on to universities. The duration of university education is four years. If a student wishes to enter a university although his records are below the entrance standard, he will be given a chance to obtain a diploma from a special school and gain a job. If he has had a certain period of practical experience and is recommended by his superviser, he will be able to enter university. In-service training will be described in Chapter 8.

Sokoine University of Agriculture

This university is the only university at the top of forestry and agriculture education in Tanzania.

The Department of Forestry, as the forerunner of the present Faculty of Forestry, was set up at Mokerere University in Uganda in 1970 with the intention of training professional foresters in Uganda, Kenya and Tanzania. Following the collapse of this three-country community in 1975, the Tanzanian government restored it as the Forestry Department of Dar es Salaam University in Morogoro with assistance from NORAD (Norwegian Agency for Development Cooperation) in order to achieve the initial goal. Subsequently, the department became a division in 1974, and a complete faculty in 1984. When Sokoine University of Agriculture was founded in Morogoro, the faculty was incorporated into the university and has remained there to date.

This university consists of the three Faculties of Agriculture, Forestry and Veterinary Medicine and two affiliated laboratories. The Forestry Faculty currently has 31 instructors, including 30 Tanzanians. Its technical and

clerical staff comprise 27 members in Morogoro, 6 members in the Mazumbai experimental forest and 86 members in the Olmotonyi experimental forest.

This college is composed of faculties and graduate schools (master's and doctor's courses). The number of freshmen is limited to 50 every year. By 1991, it had graduated 354 people.

Master's Course

The master's course was set up in 1974, when education was jointly provided by Sokoine University and the College of Agriculture based in Norway. In 1978, Sokoine University alone began to provide all lessons to students at Morogoro. By 1991, 61 students became masters. The master's course requires students to receive instruction and present their theses. Instruction is given in required and selected subjects.

Doctor's Course

Students conduct only research. There are two types of course, namely, fixed-time and part-time courses. The terms of these courses are specified as four years and six years, respectively. By 1991, nine students had obtained doctorates.

Instructor

The titles of instructors and their qualifications are as follows:

Title	Qualification
Full Professor	Doctor
Associate Professor	Doctor
Senior Lecturer	Doctor or master with long experience
Lecturer	Master and Doctor
Assistant Lecturer	Bachelor
Tutorial Assistant	Bachelor

Promotion is determined by the number of study reports, and also requires a certain period of experience.

The Faculty of Forestry has five departments, to which instructors are assigned as follows.

Department of Forest Biology	Number
Associate Professor	2
Senior Professor	2
Lecturer	4
Assistant Lecturer	1
Department of Forest Economics	
Full Professor	1
Associate Professor	1
Lecturer	2
Assistant Lecturer	1
Department of Forest Engineering	
Associate Professor	2
Lecturer	2
Assistant Lecturer	1
Department of Forest Management & Mensuration	
Full Professor	1
Associate Professor	1
Senior Lecturer	1
Lecturer	1
Assistant Lecturer	1
Department of Wood Utilization	
Associate Professor	1
Senior Lecturer	2
Lecturer	1
Assistant Lecturer	1

The present enrollment of students:

	1st	2nd	3rd
Faculty	37	46	20
Master's Course	2		
Doctor's Course	2		

As a rule, the faculty can accept 50 students, while the master's and doctor's courses can accept 5 students, respectively.

Foreigners are also permitted to enter the university, and there are generally only two or three foreign students. Although students can choose to pay their own educational costs, no students do. It is common for them to depend on various forms of scholarship.

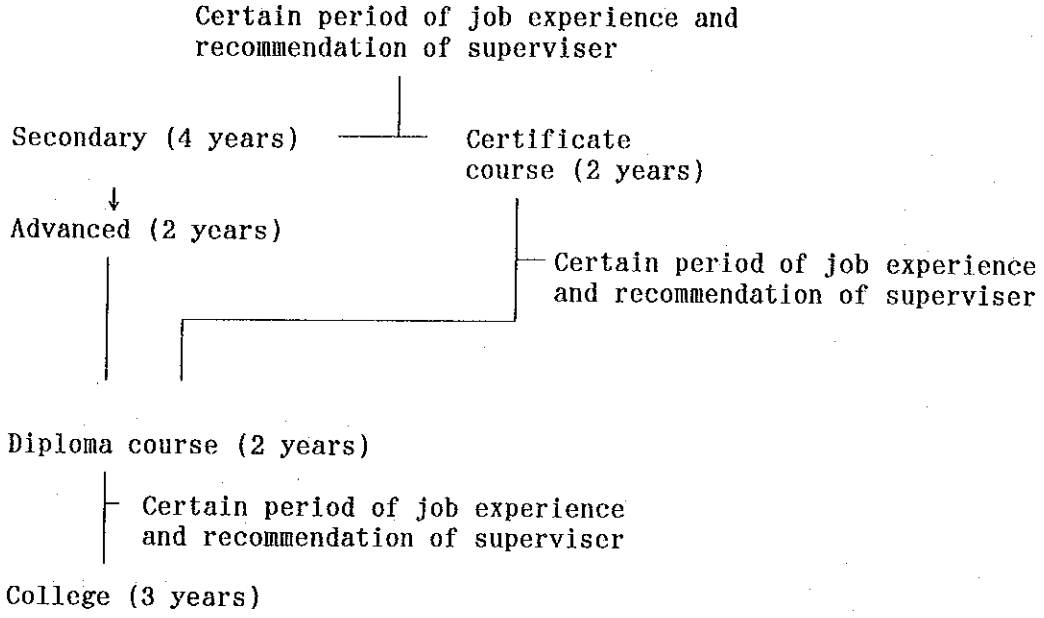
As a rule, this university can accept a total of about 300 students, of which the largest number of 200 are allocated to the Faculty of Agriculture, 30 to the Faculty of Veterinary Medicine, and 50 to the Faculty of Forestry.

Graduates are generally employed by central and local government agencies and research institutes, and their employment is presently steady. Some are employed as instructors by the university to work in the faculties or experimental forests. None have joined private companies, though some have changed their jobs to the private sector after they served in government offices for a certain period of time.

(2) College Education

The Forestry Training Institute and Forest Industries Training Institute are affiliated to the Forestry and Beekeeping Division. Workers Training Centers located in Rongai and Sao Hill also accept about 150 trainees who are engaged in forestry every year.

The educational system in Tanzania that focuses on in-service training is somewhat different from the standard system from primary to university education as follows.



The government agencies of Tanzania have the in-service training system, whereby people are given chances to obtain higher qualifications at the employer's cost. This system is appropriate for improving the staff's morals and human resources.

1) Forestry Training Institute

This institute is located in Olmotonyi 15 km northwest of Arusha and is the only school that provides forestry training. Since its establishment by the Forestry Department in 1937, the institute has trained forestry technicians, also accepting foreign students.

It runs two courses, namely certificate and diploma courses. Besides these, short-term courses have been established for various purposes, including recurrent training of the persons involved in forestry.

As already mentioned, the certificate course accepts those secondary school graduates who have achieved the right standard, and they will study for two years. In the diploma course, advanced secondary school graduates will study for two years. However, certificate holders are allowed to study only

for thirteen months.

Those who wish to directly enter the institute after graduation are required to pass a selective examination jointly conducted by the Ministry of Labor and Manpower Development and the Forestry Department. Those who have received in-service training are allowed to directly take an entrance examination for the institute.

Although students are provided with food and housing free of charge, they have to pay 4000 shillings a year for training. Generally, many students receive aid from the government or other institutions.

The total number of students is limited to 160 due to the capacity of the dormitory and the scope of practical training. The number fluctuates every year depending on the government's financial status. In fact, no freshman were invited both last year and this year. Generally, the certificate and diploma courses accept around 15 students each.

Instructors include one doctor, seven masters, five bachelors and four diploma holders.

They belong to any of five departments according to subject.

Forest Biology

To master basic knowledge of forests and forestry, and protection of plants, soil and wild animals, environmental conservation and forest protection.

Forest Engineering

To master basic techniques to perform operations in forests under the forest management plan, and moreover to acquire knowledge as to how to select logging and yarding methods and methods for economically utilizing all resources in an environmentally friendly manner.

Management and Administration

To master basic knowledge of forestry policies and economics and forest management, and techniques to administer information on forest resources and prepare a report, including planning and organization for collecting information on forest resources, supervision, implementation and follow-up of such a plan, coordination of information for optimal production, and development, implementation and follow-up of a forest management plan.

Extension and Community Forestry

To master how to understand other people or groupsconcerned in tree planting, utilization and environmental conservation, how to plan forest protection, managemnet and utilization and how to implement such a plan, and how to promote tree planting as well as land use while meeting the needs of inhabitants and environmental conservation.

Wood Technology

A rational way of using timber will be planned and organized so that locals may learn it. The actual conditions of the existing timber industries and their demand for material will be explained to the locals.

For practical training, a nursery designed to plant trees in a humid highland was set up on the campus, while a nursery designed to plant trees in an arid area was set up at a distance of 50 km.

2) Forest Industries Training Institute

This institute was founded by the Ministry of Lands, Natural Resources and Tourism in 1976. The purpose of the foundation is to provide basic and applied training which could meet the actual needs of the timber industries in Tanzania, including logging, saw-sharpening, sawing and timber processing technologies. The following two types of training are provided.

a. Long-term training course for Form IV (secondary school graduates)
b. Short-term supplementary training course for experienced persons. This course includes a four to eight-week course for foremen and field supervisors.

The former is also called a certificate course and requires the level of Form IV (secondary school graduates). Students are limited to those who are permitted to receive scientific or technical training. Their ages are limited to 18 to 25 years. Thus, this course is intended for students not yet employed.

In-service training for experienced persons requires the level of Standard VII (primary school graduates). Depending on the field of training, trainees must have one or a few years job experience and pass the entrance examination.

The institute has a staff of 102 members, including twelve instructors. The main building is located within a plantation of West Kilimanjaro 80 km of Moshi City, composed of classrooms and a dormitory.

At present, no student is enrolled in the certificate course (for reasons of the government's budget), while six students are enrolled in the short course. Most students depend on the government or companies for financial assistance. There is currently no student in the certificate course due to the problems of budgeting for the former and the recession for the latter. A limit of 64 students can be accepted and are required to live in the dormitory.

Although many graduates were previously employed by TWICO (Tanzania Wood Industries Corporation) as a semigovenment enterprise, no graduate is employed there these days.

The institute is managed at the government's expense, though it initially received assistance from Sweden (SIDA) from 1976 to 1980 and Finland (FINNIDA) from 1980 to 1988.

The institute has repeatedly pointed out a lack of operating funds, obsolescence of the building and facilities, and the need for reeducation of instructors. Modernizing equipment in timber industry-related areas is also necessary for a training institute of this type. However, it is a question of what expectations the timber industries in this country place on the activities of the institute.

The long-term course grants certificates to students and some expect that a diploma course will be established.

FINNIDA plans to review its past assistance to the institute in the near future in view of future cooperation.

(3) Tanzania Kilimanjaro Village Forestry Project

This project was launched in 1991 in cooperation with JICA and has entered Phase II. It aims at technological development to slow down the deterioration of forest resources and the decrease of forests in semiarid areas as far as possible.

Cooperative duties include; 1) development and improvement of nursery and silvicultural techniques, 2) creation of model forests, and 3) development and improvement of extension methods. Although training is not a direct objective of this project, technologies are transferred from Japanese experts when implementing the project, and inhabitants are trained in villages.

The assignments of the Tanzanian counterparts and required qualifications are shown below according to the above-mentioned duties.

Project Manager	Master
Silvicultural techniques	Bachelor 1, Diploma 1
Nursery techniques	Diploma 1, Certificate 1
Extension activities	Undetermined (but bachelors required)

6. Proposals

(1) Basic Circumstances

1) Topography and Climate

The territory of Tanzania extends 945,000 km^2, 2.5 times that of Japan. The Rift Valley of East Africa traverses the country from south to north. Tanzania is situated on a gentle plateau and is under the influence of a savanna climate. The annual rainfall ranges from 250 mm to 2000 mm and is around 1000 mm in many places, while there are few desert areas. Thus, the climatic conditions are not so bad for an African country in terms of agriculture and forestry. However, the savanna may change to a desert unless agriculture and forestry are properly managed.

According to data obtained several years ago, Tanzania has a population of 23 million which is increasing at a rate of some 3.3%. This is similar to Kenya.

The Forestry Division says that pressure from the increasing population has caused forests to decrease at a rate of 300,000 to 500,000 ha per year. In particular, firewood collection poses an important threat.

2) Finance

President Nyerere had remained in office for 25 years since independence and has adopted socialist policies.

Although he is proud of the greatest success in socialistic development in Africa, management of the national economy had not necessarily been successful. Tanzania has recently reintroduced a free-market economy. In the face of a global recession, the present economic management does not seem to be in a trough. However, the upswing is not apparent. Therefore, national finances are extremely tight, and the management of any Government office is required to reduce expenses and has very tough prospects.

For instance, expenditure other than personnel costs are rarely allowed, and many of the planned training courses have been suspended.

3) Terminal Rights of Land

In Tanzania, land is under the control of the central government or districts. Land under the control of districts is classified into common ownership and private ownership. Farmland and its adjoining land for housing are usually privately owned and passed on from parents to their children and grandchildren.

The total area of land under cultivation in Tanzania is 6 million ha, and the first half of the remaining land is used as pasture, while the second half is covered with forests. Since public land used for pasture occupies a large area, forest fires often occur and lead to great difficulty in carrying out forestation in the form of plantation.

To prevent fires, efforts should be made in training of systematic drills, education to reduce fires, and separate distribution of farmland, pastureland and plantation forests.

4) Farmer Forestation

If the lack of forestation funds and the long-lasting tending are taken into consideration, one cannot realistically hope for a substantial increase in the establishment of plantations.

In order to increase the number of planted trees by even one, it is the most practical to expect help from individuals, above all farmers. It is a prerequisite that they plant trees on their own land and harvest them by themselves. Therefore, the shortest way to success is to ask them to plant trees around their own farmlands and houses. The second way is agroforestry whereby they will be allowed to plant trees on public land and at the same time cultivate the land for several years, or a social forestry system whereby they will plant trees on public

land and harvest them together.

If planted trees increase in number even slightly, they will lead to water and soil conservation and fertility maintenance. There are several cases of success in farmer forestation or agroforestry in Tanzania and several developing countries. This type of forestation should be extended at all costs.

5) Current Situation of Forests and Problems

Forests in Tanzania cover an area of 44 million ha almost half the land, and over 90% of that are savanna forests where firewood is extensively collected. According to one report, 40 million m^3 of firewood is harvested every year, and savanna forests grow at the rate of 0.5 to 2 m^3 per year (around 1.0 m^3 on average). Thus, harvesting has been repeated almost to the limit. If the harvest is raised above the current level, savanna forests will decrease markedly. Another report states that conversion into farmland decreases them at a rate of around 400,000 ha per year. If the present condition is ignored, most of them will have disappeared in one hundred years from now.

As conversion into farmland and firewood collection continue, even countries having favorable conditions like Tanzania will face deterioration of national land sooner or later unless compensatory forestation is extensively carried out. If forests are left unattended after their conversion into farmland and become extensively desertified, they will not be able to recover in the normal way. There are only a few cases of success in reforesting desertified land into green land. Appropriate measures for coping with this situation are urgently needed.

6) Population Pressure

Pressure from the increasing population is also imminent in Tanzania, whose population has already exceeded 23 million and is increasing at the annual rate of 3.3 %.

The first effect of population pressure on forests is that the expanded agriculture and livestock farming will invade forests. There is a realistic concern that such invasion will accerelate the current pace of forest decline of 300,000 to 500,000 ha per year. The second effect is firewood collection. The present harvest of 40 million m^3 per year accounts for almost 100 % of the annual increment. If the collection rises above the present level, even a simple calculation suggests that the present stock will be gradually consumed and continue to decrease. If the standard of living is raised further, energy consumption will increase, so that charcoal more than firewood will be consumed and the decrease in stock will be accelerated.

From a forestry point of view, appropriate countermeasures against population pressure should also be taken without delay.

(2) Necessary Consideration for Forestry Policies

1) Coexistence of Agriculture and Forests

Like Kenya, Tanzania has an economy based on agriculture and livestock farming, on which most of the population depend. If the population increase, people dependent on these activities will also increase. The government must try to prevent forest areas and forestry resources from decreasing. That is, coexistence of agriculture and forestry. If farmers are encouraged to plant trees, a stable supply of firewood will be secured, trees for feeding animals will grow well, water and soil will be conserved, and soil fertility can be easily maintained.

The study team consider that the most realistic and easiest measure is to extend forestation to farmers and help them produce seedlings.

2) Forest Conservation

It can be assumed that forest fires occur more frequently in Tanzania than in Kenya. In fact, there are a large number of fire sites and large-scale damage found in Tanzania. This may

be attributable to the fact that Tanzania has much bushland and pasture.

The site of a fire will usually recover by natural regeneration two or three years after the fire and become indistinguishable from the undamaged area, if it suffers a fire only once.

However, if fires occur repeatedly on the same site, the recovered forest will gradually deteriorate and eventually change to desert in the end. There are a number of deplorable examples, such as Pantabangan in the Philippines, Sao Paulo in Brazil and La Mosquitia in Honduras.

It is certain that biomass resources should not be carelessly converted into CO_2 and that less damage by fire is better. Some people concerned with forestry in Tanzania request cooperation for fire prevention. Forest fires can be prevented at least by a team of trained people and fire-fighting equipment.

3) Plantation Forests

Plantation forests is also important along with planting in the soical forestry system. This is because Tanzania will also face an increase in demand for general timber and pulpwood in addition to firewood, and good natural forests will be harvested one after another to meet such demand.

Natural savanna forests show an annual increment of 0.5 to 2 m^3, but plantation forests can be expected to achieve an annual increment of 10 to 20 m^3 under good conditions; the soil productivity of the latter is some 10 times that of the former. Even under less favorable conditions, an annual increment of 5 to 10 m^3 can be expected. Areas under conditions inferior to this are out of the question when selecting sites for establishing economic forests.

In Tanzania and Kenya, an important question is which silvicultural method should be chosen for savanna areas. Over 90 % of all forests in Tanzania are savanna forests, and it is now an essential problem for this country to establish and spread suitable silvicultural techniques. Moreover, there are plenty of savanna areas all over the world, and their total area probably accounts for about half the forests throughout the world. Looking at savanna areas in developing regions alone, they are distributed in the Sahel region in Africa, the Middle and Near East, the northern part of the Asian Continent, the eastern part of Brazil, and the northern part of Chile, and face the risk of desertification.

In Dodoma, as the new capital of Tanzania, an afforestation project is under way, and this has steadily obtained good results in the forested urban areas and adjoining agricultural areas. In addition to this, there are cases of successful social forestry in the Moshi District, Kilimanjaro and the Same Heights. In this respect, it can be said that Tanzania has pulled ahead of other countries.

4) Expansion and Promotion of Village Forestry

The key to success in village forestry is 1)the exclusive terminal right, 2) stable supply of seedlings and 3) enthusiasm in promoting technicians, etc.

Tanzania has several successful cases of village forestry, which are well managed under different conditions. They include 1) the Same Heights, 2) the Moshi Plateau (Moshi through Same) and 3) the vicinity of Dodoma as the new capital.

In Same, Kilimanjaro, "The Kilimanjaro Village Forestry Project" is under way as a JICA project, and attracts high expectations and attention.

As stated in the previous section, social forestry is increasingly needed in Tanzania and the rest of the world, and the present circumstances are pushing the spread and establishment of social forestry.

(3) Possible Direction of the Manpower Development

1) University Education

Sokoine University of Agriculture has a Faculty of Forestry where students are limited to 50 and has a graduate school (master's and doctor's courses) for education. An increase in the number of students is not currently requested. Instead, qualitative improvement is strongly needed.

Graduates desire to enter the master's course, and masters desire to go on to the doctor's course. However, this is just their wish, and the present situation seems to be well-balanced.

Students strongly need qualitative improvement in research equipment and the introduction of new equipemnt. At this moment, basic research equipment is old-fashioned and obsolete, and office automation equipment is extremely poor.

2) Special Education

The Forestry Training Institute in Olmotonyi and Timber Industries Training Institute in Moshi have traditionally provided education and developed manpower to meet the needs of the forest and timber industries. In the past, their education seems to be essential and sufficient.

In recent years, the pressure of populations has been raised owing to the spread of medicare. For future development, it is not enough to merely maintain the status quo. Moreover, financial difficulties make it impossible to continue even conventional education, and forest conditions cannot be neglected.

"Forest conditions cannot be neglected" means the desertification of savanna areas, which is caused by population pressure. The problem of the population is not a matter to be directly dealt with on the side of forestry. In terms of forestry, possible measures include 1) a foresting semiarid

areas, 2) extending social forestry, 3) utilizing harvested timber, and 4)preventing fires from destroying forests.

Another problem is that the high-class leader of society are rarely willing to engage in the field work. The only way of solving this problem is to set up a new educational course for leaders who engage in field work as an initial condition and seek applicants for the course. The AP or SP systems or International Development Specialist in Japan may be similar to such a leader. Field work leaders should have better salaries than office workers.

A shortage of staff responsible for extension is a problem common to Tanzania, Kenya and other countries.

A promising solution is to set up promotion courses for field-work leaders (a certificate course, and a diploma course for selected leaders) at Forestry Training Institute in Olmotonyi. Short-term special courses in fire prevention will also be necessary for environmental conservation.

It is also recommended that a course in resource utilization (to obtain a certificate and eventually a diploma) should be set up at the Timber Industries Training Institute in Moshi.

Nevertheless, there is a fear that the recommendation for new courses may be dampened by financial restrictions. In fact, even some of the existing courses face financial difficulty in continuing.

To resolve this situation, a high-level solutions must be considered in terms of global environmental conservation.

5) Arid Zone Afforestation Training Center

As previously stated, population pressure and decreases in tropical forests are becoming imminent problems for developing countries. The best measure to cope with these is to utilize the increasing population and positively develop afforestation activities in semiarid areas.

Forestry in semiarid areas has conventionally been impossible. Forestry, being primarily an economic activity, must survive economic competition. Forestry enables marketable products to be produced in areas where the average increment in cutting age is high, soil fertility is high, and transportation costs are low. However, the afforestation of semiarid areas must be developed in a different way from the economic activity. In terms of efficiency, it will be difficult if manpower for afforesting semiarid areas is developed along with conventional forestry under the economic system. Therefore, it is preferable to establish a new system of education and training in a suitable place free from the framework of conventional forestry.

In Tanzania, forests occupy almost half the territory or 44 million ha of which over 90 % is covered with savanna forests. At this moment, that is decreasing at the rate of around 400,000 ha per year due to the pressure of population. If the present condition continues, all forests will have disappeared less than one hundred years from now. Appropriate measures are urgently needed.

Cooperation projects for forestry have been separately implemented and have yielded good results in semiarid areas in Tanzania. If their results are integrated, these projects will result in more benefits in both training and promotion activities. There are probably many countries which wish to carry out a similar type of training.

Moreover, several cases of success in social forestry in Tanzania will be useful to practical exercises or case studies.

We consider the provision of training facilities for foresting semiarid areas in Tanzania to be a good topic to pursue.

In this case, Morogoro is the best site for study. Sokoine College, the Forestry Research Institute (TAFORI) and the Forestry Seeds Center are located in Morogoro, which is also geographically near several successful sites of social forestry.

6) Education and Training in General

Generally, education and training are carried out in basic forestry subjects at colleges and training institutes, and there seems to be no special problem. However, the afforestation of semiarid areas is a big and urgent problem and has not yet been developed in a definite way, and actually lacks systematic education and training.

Colleges, universities and research institutes should concentrate their efforts on research in the afforestation of semiarid areas and transfer the results of research to education and training as early as possible.

As noted in the Action Plan for Forests, incumbent foresters and researchers should be retrained in order to understand the afforestation of semiarid areas.

For this purpose, special training department should be set up at colleges, universities, and research and training institutes. It is also an urgent requirement to train instructors and prepare curricula.

JICA