REPORT AND RECOMMENDATIONS

on

THE DEPARTMENT OF FORESTRY, COLLEGE OF AGRICULTURE
SEOUL NATIONAL UNIVERSITY

by

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CONTENTS

INTRODUCTION

This report has been prepared following about two and one-half months in Korea, August 20 to November 7, 1956. During this period the writer had an excellent opportunity to study Korean forestry conditions, forestry education, and forestry research. This background of knowledge of Korean forestry was very valuable in appraising the position and needs of the Department of Forestry, College of Agriculture.

The writer would like to express his thanks and appreciation to the many Korean foresters and others who combined to make his stay in Korea instructive, interesting and, it is hoped, productive. The fine cooperation, the hospitality, and continual assistance received are deeply appreciated. In this regard it is desired to make particular mention of Dr. Hyun Sin Kyu and his staff of the Department of Forestry, who were unfailingly helpful and cooperative. Without their continual assistance the writer would not have been able to carry forward his study, nor could he have gained the necessary understanding of Korean forestry education.

During his stay in Korea the writer was afforded abundant opportunity to travel in all mainland provinces and observe forest conditions. For these opportunities the writer wishes to express his special thanks and appreciation to Dr. A. E. Schneider, Chief Adviser in Korea, Seoul National University Cooperative Project; to Bureau of Forestry Chief Kim Yung Joon of the Ministry of Agriculture and Forestry; to the staff members of the Bureau of Forestry; to Burlin Hamer, Dayton Kirkham and Yook Dong Baek of OEC; to Dean Cho Baik Hyun and Forestry Department Head Dr. Hyun Sin Kyu and their colleagues of Seoul National University's College of Agriculture; to personnel of the Central Forest Experiment Station; to forest products industry representatives; and

to many provincial foresters and soil erosion specialists. Without their assistance and cooperation the writer could not have gained the knowledge of forest conditions and problems essential to an evaluation of the forestry education and research needs of Korea.

Approximately one month of the writer's stay in Korea was spent in the field with foresters and agricultural specialists. These opportunities to witness numerous examples of forest devastation, soil erosion, forest erosion control projects, planting projects, forest products industries, and examples of productive forests have impressed the writer with the urgent need for a greatly broadened and increased forestry program, and with the importance of developing the Department of Forestry, College of Agriculture, into a particularly strong training and research center.

The writer's travels while in Korea are roughly indicated on the map which is included as a part of these introductory comments.

This report was prepared in sections, each section devoted to an important aspect of Korean forestry and its impact on forestry education or directly to the Department of Forestry of the College of Agriculture. At the close of each section are summarized what the writer felt to be important conclusions and recommendations. The most important of these recommendations were then brought together in a general section, "Summary of Recommendations", which forms the first portion of the main body of the report.

Two brief papers prepared and presented while in Korea are included in the appendix to this report. The first,"Some Impressions of Korea's Forests and Forestry Problems", summarizes what to the writer appear to be the most important forestry problems and how these are related to education and research

in the Department of Forestry, College of Agriculture. The second, "Research and Graduate Training", covers an aspect of education that must not be overlooked in the development of the Department of Forestry and College into what should be the single strong graduate training center in Korea.

Dotted Lines Indicate Field Trips Taken

in Korea

SUMMARY OF RECOMMENDATIONS

Recommendations on various aspects of the work, facilities, and plans of the Department of Forestry, College of Agriculture, Seoul National University are given in each of the sections of this report. The most important of these are brought together at this point.

Organizational Status

1. It is recommended that consideration be given to renaming the College of Agriculture the "College of Agriculture and Forestry". The latter was the name of the College until liberation and integration as part of Seoul National University. The recommended name change would recognize the importance of forestry in Korea in the same manner that it is recognized in the Ministry of Agriculture and Forestry. It would emphasize the close relationship between forestry and agriculture as well as their difference. It would give the type of recognition to forestry in the College that is needed to enable it to become the recognized single strong school of forestry in Korea. Such a change would give recognition to the existence of forestry within the College without detracting in any manner from the importance of agriculture. The writer believes that agricultural and forestry education in Korea should be closely associated, and that the great importance of forestry to agriculture and the entire economy requires recognition of the type proposed.

2. It is further recommended that the present Department of Forestry be designated the "School of Forestry, College of Agriculture and Forestry". The Department of Forestry is now generally referred to as the School of Forestry; the suggested change would thus bring its designation into agreement with what it is commonly understood to be. It would provide the University, College and School of Forestry with another means of emphasizing that this institution plans to develop a forestry training and research center of strength and high standing.

3. A third organizational recommendation is that the School of Forestry be organized into two departments: Department of Forest Production, and Department of Forest Utilization. It is the writer's considered opinion that Forestry cannot, as a single department in the College of Agriculture, develop to the extent and in the manner necessary to give it recognized dominance and stature in the realm of Korean forestry education and forestry generally. The two departments suggested are

logical and commonly recognized. They encompass the entire field of forestry, production and utilization. Although the desirability of a third department, Forest Erosion Control, is frequently suggested by Korean foresters, the writer feels that this is presently an important aspect of Forest Production and should be included under that area. The forestry activities proposed for inclusion in the Department of Forest Production are: silviculture, management, mensuration and photogrammetry, forest tree genetics, dendrology, protection, surveying, engineering, and policy. Included in the Department of Forest Utilization would be: logging, products processing and manufacture, wood chemistry, and wood technology. With acquisition of the several additional staff members recommended later in this report, these departments of the School would be somewhat different in size, but they would compare very favorably in size and strength with existing departments of the College.

It is the writer's conviction that adoption of these organizational proposals will materially assist the University and College in developing the type of forestry training center needed in Korea. Such recognition of the importance of forestry in the institution, together with orther additions and changes proposed, should eventually result in bringing greater order out of the present chactic condition of forestry education in Korea. The University, College, and School of Forestry could well be planning other means of elevating instruction at this institution above that of the other seven Korean forestry schools. It is suggested that consideration be given to eventually making the School of Forestry a "Senior College and Graduate Training Center", with students admitted by examination to the junior or third year, and with elimination of freshmen and sophomore classes. It is possible that by this means the School could draw from other forestry schools, as well as from other basic training programs, a group of particularly outstanding students. Since all but two of the professional forestry courses are included in the third and fourth years, such a change would not seriously complicate present instructional plans. It is admitted that such a change may be far in the future, but it should not be overlooked as a possibility.

Facilities

1. The designation of a section of the new buildings planned for the College as the School of Forestry will be helpful in giving the type of recognition needed by Forestry for development into the single, strong, recognized Forestry School of the Nation.

2. Because of the complete lack of forest utilization research in Korea at present, there is opportunity for the College to make immediately practical and economic contributions through research in this field. The need for utilization research and the importance of having sufficient equipment for teaching of forest utilization courses call for the construction of a Forest Utilization Laboratory. It is suggested that this Laboratory be sufficiently large to house not only the equipment purchased and the additional equipment recommended but a combination classroom-laboratory as well. Such provision would make it possible to concentrate most of the utilization training in one place, near the materials and equipment needed in this training. Because of the total lack of forest utilization research in Korea, the College through its Forest Utilization Laboratory could make important contributions to Korea's economy and could take the kind of research leadership in forest utilization that it has gained in forest tree genetics. The field of forest utilization is one of the few areas in all of Agriculture and Forestry where there is a total lack of research and where College leadership is still possible.

3. The construction of several buildings the Kwangyang Experimental Forest and at the two Protection Districts (Chusan and Kwandong), which are considered of sufficient area and variety to take care of all possible teaching and research needs of the School of Forestry, is important to the forestry training and research programs. The structures and items of equipment needed to make the Kwangyang Experimental Forest such a field center are given in one section of this report.

4. The College and School of Forestry are faced with a grave and important problem with regard to the continued protection and management of the large area of the Kwangyang Experimental Forest in the Yongok and Chikjon Protection Districts little needed or used for research. Since the Experimental Forest contains some of the best remaining forest of Korea, it could be a profitable management operation for the College and School if they could obtain for use all or a good share of the potential income. Under the present tenureship arrangements, all present and potential income will go to the Central Government. It is recommended that the possibility of obtaining all or part of the income from sale of products on the

Kwangyang Experimental Forest be further investigated. If the possibility of obtaining and using such income does not exist, then the University, College, and School will be faced with a serious decision on what to do with the large area in the Yongok and Chikjon Protection Districts. If additional funds for continuance of protection and management of these areas could be made available by the Central Government, the University might well hold on to these areas. If the present rate of destructive cutting continues, the Kwangyang Experimental Forest could take on even greater value.

5. Additional equipment having an approximate cost of $6,300 is recommended for purchase for use in Forest Production teaching and research. This equipment list includes tents, a small electric generating plant, and communications system equipment. These special items are needed in the rehabilitation and reequipping of the Kwangyang Experimental Forest.

6. Final recommendations on equipment for Forest Utilization teaching and research will be made following the writer's visit to the Philippines. It is roughly estimated that the cost of the minimum equipment needed for a Forest Utilization Laboratory adequate for teaching and research under present conditions will be about $15,000.

Staff

These recommendations on staff needs were considerably influenced by the writer's conviction that all staff members of the School must be engaged in research and provided with time for research, in addition to their instructional duties. Also, the almost complete lack of forest production and utilization research in Korea gives the College excellent opportunity to assume leadership in other fields in addition to the presently established and recognized leadership in forest tree genetics.

1. The minimum added staff needs of the School are considered to be:

   a. One man in forest utilization teaching and research
   b. One man in aerial photogrammetry, logging, and engineering (now not available or handled largely by lecturers)
   c. One man in forest soil erosion control (now handled by a lecturer)
   d. One man in forest tree genetics to assist Dr. Hyun.

   In addition sufficient funds should be provided to employ graduate student assistants, particularly in silviculture, utilization, and genetics.

2. Every effort should be made to assure that Forestry staff members are trained at least to the M.S. level, either in Korea or in some other country. Also, it is recommended that consideration be given to sending Instructor K. B. Yim to Minnesota for additional training.

3. The younger staff members need additional forestry experience. Some of this can be obtained through teaching and research. But more valuable training, that would give them greater confidence and improve their effectiveness as teachers, could be obtained through short periods of employment or assignment to the Bureau of Forestry, Central Forest Experiment Station, or provincial forestry groups.

Curriculum and Instruction

1. It is recommended that for the present, the single, strong, and reasonably well-balanced forestry curriculum be continued for all students, but that more electives be provided by eliminating the requirement for two semesters of Wood Chemistry and by reducing the Wood Preservation requirements to one semester. If a strong demand for graduates more thoroughly trained in Forest Utilization develops, consideration should be given to establishing a curriculum in this field.

2. It would appear desirable to require or encourage students to utilize some of their elective credit for course work in writing and public speaking, which they will use more in their life's work than any other courses.

3. As duplicating facilities become available to the College, it is recommended that all instructors prepare low cost course material in this form for their classes. This will enable greater coverage of subject matter, which is often quite limited under the present system of few texts and almost total reliance on lectures.

Graduate Training and Research

1. A strong graduate training center in forest production and forest utilization is needed in Korea. The forestry training center of the College of Agriculture should be developed to satisfy this need. This will require at least the increase in staff recommended; the provision of time for research; research training, interest, and ability on the part of staff members; and some provision of funds or scholarships for graduate students.

2. The research needs of Korea in all fields of forestry are so

great and the forestry situation is so critical that, for the time being, the majority of the research should be directed to the solution of practical and pressing problems. Work in close cooperation with other agencies, other departments in the College, the Bureau of Forestry, Central Forest Experiment Station, and provinces is essential.

Korea's Forests - Their Condition, Importance, and Potential

There must be an important basis or reason for any worthwhile effort. This is applicable to forestry education and research. Is there sufficient basis in Korea for the existence of a strong forestry training and research center? The answer to this appears to the writer to lie in some important statistics and general information available in the literature and additional information gathered during extensive travel in all mainland provinces.

Amount of Forest Land

The forest lands of Korea occupy very nearly the same area as the forest lands of Minnesota. Classed as forest lands, land better suited to growing tree crops than to agriculture, are 6,396,555 chongbos (16,172,500 acres) out of a total of 8,854,000 chongbos (22,135,000 acres). Forest land constitutes 73 percent of the total land area, agricultural lands 23 percent, and 4 percent are wastelands or used for other purposes. Percentage-wise Korea has more land in forests than any Asiatic country except Japan, and is exceeded by few in the western hemisphere.

The forest lands are primarily the mountain slopes and the more mountainous provinces have the highest percentage of land classed as better fitted for producing tree crops than for agriculture. The percentage of forest land by provinces is as follows:

Province	Total Forest Land (Chongbos)	Percent of All Land
Special City of Seoul	9,773	53
Kyonggido	614,803	60
Chungchong Pukto	532,196	76
Chungchong Namdo	486,132	68
Cholla Pukto	542,727	77
Cholla Namdo	796,001	72
Kyongsang Pukto	1,369,914	79
Kyongsang Namdo	831,071	75
Kangwon Do	1,129,749	89
Chejudo	84,090	70
	6,396,555	73

Source: 1954 Korean Yearbook of Agriculture

Condition of Forest Lands

Because of destruction during the recent war, long time over-cutting due to serious shortages of fuel, and years of raking all available needles and leaves from the forert floor for use as fuel and compost, the majority of the forest lands of Korea are today relatively nonproductive. Because of serious destruction and over-cutting, the total timber volume on all forest lands in 1954 was estimated at about 51,800,000 cubic meters. This is about 8 cubic meters per chongbo or 1 cord per acre. In the United States, stands of less than 7 to 8 cords per acre are considered of questionable merchantability.

The total and average volume figures give but part of the total forest-land condition picture. Over-cutting and raking of forest floor material have resulted in extremely severe erosion over vast areas. It is estimated that more than 600,000 chongbos (1,500,000 acres) will need expensive terracing and other soil erosion control work to bring them back into any kind of productive condition and halt further erosion. It is not uncommon in Korea to see rather good stands of young and pole-size pine with the forest floor as bare as the surface of a dirt road. Erosion beneath such stands can be and is frequently as bad as that on completely denuded mountains. Such areas illustrate the fact that it takes more than trees to make a forest.

In addition to the tremendous areas so badly eroded that expensive soil erosion practices will be needed to return them to productivity and protect the agricultural lands, more than 1,000,000 chongbos (2,500,000 acres) are estimated to have been so denuded that they are in need of planting. Serious damage to red pine reproduction by insects, particularly by the "Pine Defoliator", may greatly increase the area in need of planting.

Scattered throughout Korea, particularly in the less accessible mountain areas and away from cities and towns, are many examples of productive and good quality forest stands. With abundant rainfall, 1000-1200 mm or 40-50 inches per year, and with favorable soils where they have not been too seriously depleted by erosion, the physical conditions for tree growth are good. The good stands of many species found in remote areas, plus the rapid growth where protection has been effective, indicate that there is real potential for added forest production.

The native and introduced tree species are fairly abundant and provide a considerable variety, both of conifers and hardwoods. Of particular interest is the extensive planting of Pitch pine (Pinus rigida) throughout Korea. It appears to be completely hardy, makes rapid growth, is of good form, and generally appears to be a better tree in Korea than in its native habitat, the United States. The fact that it does not regenerate itself naturally, even though it is a heavy seed producer, is a rather serious shortcoming. Possibly the most reproductive and persistent conifer in the world is Korean red pine (Pinus densiflora). It produces abundant seed at an early age, regenerates well on bare soil, of which there is always an abundance, and grows surprisingly rapidly on better soils. Its generally poor form may be attributable at least in part to years of selection of straight and good-form trees for cutting, leaving the crooked, poor-form trees to reproduce. Without Korean red pine, scrubby and crooked as it generally grows, Korean villagers would have suffered even more than they have from lack of fuel.

Products of Korea's Forests

Fuel is the most important Korean forest product. It is estimated that 80 percent of the timber cut annually goes for fuel. In addition, the

forests produce a large tonnage, possibly double the wood tonnage, of needles, leaves, twigs and grass, which are used for fuel and compost. The villages, in which dwell 72 percent of the population, are totally dependent on the forest lands for fuel. Lack of roads and transportation will apparently make close to 3/4 of the population always totally dependent on forest fuels. In addition, the towns and cities use large quantities of wood, charcoal, and other forest fuels. Additional tonnages of coal are being produced in Korea and there is some use of oil in the towns and cities, but the reliance on wood for fuel is heavy even in large population centers. The transportation of forest fuels is the largest single transport item in Korea today. The important fact that must not be lost sight of in evaluating the present and future importance of Korea's forests, is the total present and future dependence of the rural population, about 75 percent of the people, on the forest land for fuel. Unless the same concentrated attention is given the forest lands that agricultural lands are receiving, the people may in the future be better fed but will probably suffer from lack of fuel.

But fuel is not the only Korean forest product. The extensive reconstruction evident everywhere places a tremendous demand on the forests for lumber, poles, posts, and other materials. Importation of Philippine mahogany probably has some effect in reducing over-cutting of merchantable timber, but it is estimated that Korea's merchantable timber is being cut many times as rapidly as it is growing.

The Importance of Forest Lands to Agriculture

Second only to the importance of the forest lands for fuel and timber products, is their importance to agriculture as a source of water. Korean agriculture is based on the availability of large volumes of water, most of which comes from the forested or deforested mountain slopes. Denudation through destructive over-cutting for fuel and years of raking of

foilage has resulted in many serious water problems. Denuded mountain slopes do not hold water and release it gradually or permit it to seep in. They may yield as much or more water than forested slopes, but the yields frequently come in the form of floods that inundate rice paddies, damage dikes, deposit infertile upland soil on productive agricultural land, and build up stream bottoms to heights as much as 12 feet above surrounding rice paddies in some localities. It is estimated that floods which originate on denuded mountain slopes inundate and damage 20,000 chongbos (50,000 acres) of agricultural land annually in addition to destroying or seriously damaging countless homes, bridges and other structures and improvements.

A significant feature of soil erosion that is important to any discussion of the importance of forests and forestry in Korea, is the fact that practically all of it occurs on forest lands. This is in marked contrast to the United States, where practically all of the erosion is on agricultural lands. In Korea, soil erosion control work is directed through the Bureau of Forestry of the Ministry of Agriculture and Forestry. It is considered a forest management problem more than an agricultural problem.

The Productive Potential of Korean Forests

Korea has the potential in her forest lands for production of abundant fuel, construction materials, and other forest products. With proper management and recovery of the large acreage of denuded and relatively non-productive lands, which now make up such a large part of the total, Korea's forests could furnish all of her timber needs and possibly become a timber exporter. Such a possibility may be far in the future, it will require a tremendous effort, and its accomplishment may be confronted with many difficult problems, but the potential is everywhere evident.

The Problems and Needs of Korean Forestry

The problems and needs of Korean forestry are not easily summarized. The magnitude of these problems and many needs are dealt with in some detail in the UNKRA report "Rehabilitation and Development of Agriculture, Forestry, and Fisheries in South Korea."

Some of the most critical of these needs and problems are summarized in a brief general report presented by the writer on November 3, 1956, to representatives of many Korean forestry agencies and staff members of the Ministry of Agriculture and Forestry. A copy of this general summary, which will be published in the Korean Forestry News, has been included in the appendix to this report.

Among the many important needs and problems dealt with in the writer's summary, as well as in most other similar summaries of the Korean forestry situation, is the need for the development of a strong, well-equipped, and well-staffed School of Forestry. In addition to the need for a strong School of Forestry, which would provide better instruction for undergraduate foresters, there is the additional need for research and the training of research workers. The need for research and the training of research workers in Korea have been covered in a separate report presented by the writer to the Korean Agricultural Society on October 1, 1956. A copy of this paper, to be published in the 1957 Proceedings of the Agricultural Society of Korea, will also be found in the appendix.

Without the development of such a strong training center for under-graduate and graduate students, and without the additional research contributions that such an institution can make, Korea's important forest program will not move forward as rapidly as is essential to the total economy of the Nation.

An outstanding training center of the nature visualized as needed should be developed within Seoul National University and form an important part of the College of Agriculture program.

Forestry Education in Korea

Development and Present Status

Forestry education in Korea was initiated in 1906 with the establishment in Seoul of the School of Agriculture and Forestry. The School moved to Suwon in 1907. In 1918 the School was raised to the status of a college and named "The College of Agriculture and Forestry".

During the period of Japanese rule, most forestry education as conducted by Japanese foresters and relatively few Korean foresters were trained. Following liberation from Japanese rule and incorporation of the College as a part of Seoul National University, forestry education was conducted by the present Department of Forestry, College of Agriculture.

Recent Developments

In contrast to the concentration of forestry education in a single institution and the training of few Korean foresters prior to liberation is the existing situation. Since 1945, forestry training has been initiated in the following institutions:

College	Province	Date of Establishment
Chunchon College of Agriculture	Kangwon	1947
Kwanju College of Agriculture	Cholla Namdo	1951
Chinju College of Agriculture	Kyongsang Namdo	1948
Chongju College of Agriculture	Chungchong Pukto	1950
Chon Puk (Iri) College of Agr.	Cholla Pukto	1947
College of Agr. and Forestry of Tongguk University (Private)	Seoul	1953
Koryo University (Private)	Seoul	1954

The enrollment in these forestry schools is not definitely known, but most of them have more forestry students enrolled than does the College of Agriculture at Suwon. The writer visited the Chunchon College of Agriculture, and obtained information on forestry training at Tongguk University from Dong Baek Yook, Lecturer in Forest Erosion Control at Tongguk. The enrollment in forestry at Chunchon College of Agriculture was reported to be 240 and that at Tongguk University 160. Judging from these reports, it would appear that over 1000 students are enrolled in forestry training courses at Korean colleges and universities.

It is evident that Korea does not suffer from lack of forestry training nor from lack of interest in forestry on the part of students. The two forestry training schools mentioned above, on which the writer has information, indicated that they accepted 20 to 30 percent of applicants. This acceptance rate is similar to that for forestry applicants at Seoul National University's College of Agriculture.

The writer is not in a position to judge the quality of forestry training offered in these too-abundant forestry training centers. It appears that they are generally poorly staffed, poorly housed, and poorly equipped. It would be difficult to visualize any other condition for training centers that have sprung up so rapidly during a period of disorganization and turmoil.

The UNKRA report "Rehabilitation and Development of Agriculture, Forestry, and Fisheries in South Korea" (1954) recommended: "That only one college of forestry be established for South Korea and that it be attached either to Seoul University or to the Suwon Agricultural College whichever is found most convenient. The advantage of Seoul University is the proximity of the Central Forest Experiment Station so that students would have the advantage of lectures from the research workers in their subjects." Other recommendations made in the UNKRA

report were: that the forestry enrollment at the Suwon College of Agriculture be limited to about 30 per class, or about 120 for the 4-year program; that four-year professional forestry training, as offered by the colleges and universities in the provinces and private institutions be discouraged in every possible manner; and that these new schools consider assuming the responsibility for providing the necessary vocational, ranger, and short-course training needed instead of attempting to offer professional forestry training.

From this brief treatment of developments in forestry training in Korea, the following conclusions appear evident:

1. Korea has too many forestry schools and too much forestry training at the professional or 4-year level for her needs.

2. Much of this training is at present inadequate and will probably remain inadequate. It will be forestry training largely in name and not in fact.

3. With the critical need in Korea for developing at least one strong forestry training center offering 4-year training, all Ministry of Education financial support for 4-year forestry training programs in provincial colleges and universities certainly should be discontinued.

4. The present provincial and private forestry training programs should be encouraged to develop in the vocational, ranger-training, and short-course fields. A great deal of forestry training is needed in Korea, from the primary grades through college, and there is opportunity for training at less than the 4-year college level. The provincial and private colleges now offering professional forestry training would be better staffed and equipped to offer vocational, ranger-training, and short-course work than 4-year professional forestry training.

5. Although it may be desirable, the prospects of 4-year forestry training being discontinued in the provincial and private institutions do not appear encouraging. Ministry of Education withholding of support funds from these institutions would not prevent the provinces from continuing them. This is democracy in action. It may be wasteful but is not all loss. The existence of this situation places heavy pressure on Seoul National University and the College of Agriculture to develop its forestry training to a degree of excellence that will be unchallenged in Korea. If the University is willing and able to accomplish this, Korea will in fact have but one strong recognized forestry training center. If the University is unable or unwilling to engage in such development, forestry education in Korea could

become even more chaotic.

6. Many of the writer's recommendations relative to the needs of the Department of Forestry, College of Agriculture, of Seoul National University, were influenced by the critical situation that exists in Korea relative to the over-abundance of apparently inadequate 4-year forestry training.

The Department of Forestry

Its Organization, Staff, Facilities, Equipment, and Responsibilities

The history of the Department of Forestry has been covered to some extent in the section of this report on history of forestry education in Korea. The present Department was in the beginning part of the School of Agriculture and Forestry, then a part of the College of Agriculture and Forestry, and since liberation and incorporation as part of Seoul National University, one of eight departments in the College of Agriculture.

About 500 Korean foresters have completed work for the B.S. degree in the fifty years of forestry training at Suwon.

Registration by classes in the Department of Forestry in 1956 is as follows:

Freshmen	30
Sophomores	30
Juniors	33
Seniors	35
Total	128

It is planned to limit enrollment to about 30 per class.

The Staff and Its Training

The staff of the Department is as follows:

Professors: S. K. Hyun (Ph.D.), Department Head
S. H. Bang (B.S.)

Associate Professors: J. S. Shim (Ph.D.)

Assistant Professors: T. B. Lee (M.S.) On leave for study at Harvard in the field of Dendrology

Instructors: T. S. Park (M.S.)
K. B. Yim (B.S.)
J. S. Sin (B.S.)

Lecturers: T.Y. Cho (B.S.) in erosion control - from Kyonggi Do Forestry Association
B. J. Chung (M.S.) in forest engineering - from Chon Puk College (Iri)

The graduate training of staff members was at the following institutions:

Dr. S. K. Hyun	University of Kyushu, Japan
Dr. J.S. Shin	Yale and Michigan Universities
T. B. Lee	Harvard University
T. S. Park	New York State College of Forestry, Syracuse
B. J. Chung	Michigan University

In addition to their responsibilities in the Department of Forestry, staff members serve in the following capacities in the College:

Dr. Hyun	In charge of the Forest Genetics Institute, which is financed by a separate appropriation through the Ministry of Agriculture and Forestry
Dr. Shim	As Library Adviser
Mr. Bang	As College Registrar
Mr. Park	As Equipment Inventory Adviser

The writer wishes to emphasize that his evaluation of Forestry Department staff quality is general. The short period of the writer's stay in Korea and his rather limited contact with some of the younger staff members, makes a more thorough and critical evaluation impossible.

In Department Head Dr. Hyun the Department and College have a capable and effective administrator, an outstanding research worker in the field of forest tree genetics, an excellent teacher, a highly regarded leader in Korean forestry, and a fine gentleman completely devoted to development of the Department, the College and Korean forestry. His accomplishments in the field of forest tree genetics are recognized throughout the world. Through his research in forest tree genetics he has demonstrated that College staff members can produce important research along with other responsibilities. His efforts have helped provide support for the conduct of research by

College of Agriculture staff members.

Dr. Shim has as yet had little opportunity to engage in research because of many other duties. He has the necessary background of training for research and is highly regarded as a teacher. Dr. Shim is very active in the promotion of Korean forest products industries and serves as an adviser to the National Railroads as well as several forest products industries. His leadership in this field is indicated by the fact that he is presently President of the Korean Junior Chamber of Commerce, and is representing this group at the 1956 New Zealand international meeting. He has excellent administrative abilities, which have been recognized by his appointment as Library Adviser, and is capable of leading in the development of a strong forest utilization training and research center in the Department of Forestry.

Mr. Bang is one of the Department staff members with long service, whose principal responsibilities have been teaching in the field of utilization and acting as College Registrar.

The younger full-time staff members appear to be capable, enthusiastic, and deeply interested in their work. Mr.K. B. Yim, who assists Dr. Hyun in the instructional and research fields, appears to the writer to possess particularly outstanding promise as a research worker. Although the writer has not met T. B. Lee, who is on leave for study at Harvard, Professor Lee has done considerable research and is considered a fine teacher.

The Facilities of the Department

Staff members now have offices or headquarters in the Forest Tree Genetics Institute building (which is on College property but is not owned by it), in a small wood utilization laboratory, in the Library, and in the main buildings. Staff members are thus scattered among several buildings

at present. The College is fortunate to have the Forest Genetics Institute building. Without it the Forestry Department staff would have little space and no real headquarters.

Classes are conducted in classrooms of the main buildings and in the Forest Utilization laboratory.

The training and research equipment of the Department is covered in separate sections of this report entitled "Forest Production Equipment and Equipment Needs" and "Forest Utilization Equipment and Equipment Needs". As indicated in these sections of the report, with the acquisition of the added equipment recommended, the Department should be in a good position to assume commanding leadership in forestry training in Korea and develop into the country's recognized educational and research center in this field.

The forest properties of the Department are likewise dealt with in a separate section of this report under the heading "Forest Properties and Field Training Center." The ready accessibility of a nursery area, arboretum, plantations, and soil erosion control tracts near the College gives the Department excellent opportunity to conduct field training throughout the instructional program. With the introduction of added field training, possibly to the extent of one semester, at the Kwangyang Experimental Forest, the graduates of this institution should be excellently trained in both the classroom and field.

The Forestry Curriculum and Course Offerings

Presently all students in the Department of Forestry are enrolled in a single course of study. The course requirements of forestry students during the first year are identical to those of all College of Agriculture students. Only two forestry courses, Forest Surveying I and Dendrology, are

taken during the second year. The 3rd and 4th years are devoted entirely to forestry courses, with the possible exception of the few elective credits permitted. Some changes have been made recently, but the content of the present curriculum is about as follows:

Freshman or 1st year

Course Number	Course Title	Semester Credits Spring	Fall
101-102	Language and Literature	1	1
105-106	English	3	3
107-108	German	1	1
Ec. 103-104	Outline of Law	1	1
Ec. 101-102	Outline of Economics	1	1
111-112	Mathematics	2	2
En. 113-114	Physics	2	2
C. 101-102	Inorganic Chemistry	2	2
B. 101-102	Botany	2	2
A. 101-102	Zoology	2	2
A. 101-102	Outline of Agriculture	2	2
113-114	Physical Training	1	1
		20	20

Sophomore or 2nd Year

For. 203-204	Dendrology	2	2
For. 205-206	Forest Surveying I	3	3
C. 201	Soils	3	-
C. 204	Fertilizers	-	3
C. 205-206	Organic Chemistry	2	2
En. 201	Meteorology	-	2
B. 201-202	Plant Physiology	3	-
B. 203-204	Plant Pathology	3	-
	Statistics	2	-
	Geology 1	2	-
	Electives	2	10
		22	22

Junior or 3rd Year

F. 301	Silviculture I	4	-
F. 304	Silviculture II	-	6
F. 305	Forest Protection	2	1
F. 308	Forest Entomology	-	2
F. 309	Forest Mensuration	4	1
F. 312	Forest Valuation	-	3
F. 313-314	Wood Physics	2	3
F. 315-316	Wood Chemistry	3	3
F. 317-318	Torrent Regulation	3	2
F. 319-320	Forest Surveying II	1	1
F. 321	Field Practice	1	-
	Electives	2	2
		22	22

Senior or 4th Year

Course Number	Course Title	Semester Credits Spring	Fall
F. 401-402	Forest Management	4	4
F. 403-404	Wood Technology	2	2
F. 405-406	Forest Engineering	2	4
F. 407-408	Forest Products	3	3
F. 409-410	Logging	3	1
F. 411	Forest Policy	2	-
F. 414	Forest Law	-	2
F. 415-146	Wood Preservation	2	2
F. 418	Forest Seminar	-	2
F. 419	Field Practice	2	-
	Electives	2	2
		22	22

Graduate Course Offerings and Graduate Training

		Credits	Instructor
F. 501	Seeding and Planting	3	Hyun
F. 504	Forest Tree Breeding	3	Hyun
F. 506	Farm Forestry	2	Hyun
F. 507	Silviculture Seminar	2	Hyun
F. 508-509	Research in Silviculture	6	Hyun
F. 510	Wood Anatomy	3	Shim
F. 512	Mech. & Physical Properties of Wood	3	Shim
F. 514	Wood Seasoning and Kiln Drying	2	Shim
F. 515	Advanced Logging	2	Shim
F. 518	Advanced Wood Preservation	3	Shim
F. 520	Plywood and Laminated Construction	2	Shim
F. 521	Seminar in Wood Technology	2	Shim
F. 523	Wood Pulp and Paper	3	Bang
F. 526	Wood Plastics	2	Bang
F. 527	Seminar in Forest Products	2	Bang
F. 529	Seminar in Wood Chemistry	2	Bang
F. 531-532	Advanced Forest Management	4	Hyun
F. 533-534	Advanced Forest Engineering	4	Sin
F. 535-536	Advanced Forest Policy	4	Sin
F. 537-538	Advanced Dendrology	4	Yim - Lee

There are at present two graduate students in the Department of Forestry, both majoring under Dr. Hyun and interested primarily in the field of forest tree genetics.

Summary and Recommendations

Organizational Status

1. It is recommended that the Department of Forestry be changed to the School of Forestry, College of Agriculture and Forestry, and that it be departmentalized into two

departments: Forest Production and Forest Utilization. These suggested changes would better enable Seoul National University to develop the strong and recognized school of forestry needed in Korea. It would be a step towards assuring leadership and would permit the necessary development of forestry within the present structure of the College of Agriculture.

Staff

1. The importance of Forestry in Korea and in the College of Agriculture, the heavy teaching loads now carried by several staff members, the need for permanent staff in several important fields now staffed with lecturers, and the need to provide time for staff research, call for the early addition to the Department of Forestry of staff in the following fields:

   a. One staff member in soil erosion control

   b. One staff member in forest utilization

   c. One staff member in aerial photogrammetry, logging and engineering

   d. One staff member to assist Dr. Hyun in forest tree genetics and other work he is carrying on. Dr. Hyun will certainly become more and more concerned with administration and will need assistance to assure the Department of Forestry leadership in his fields of emphasis.

2. The younger staff members without graduate training should be encouraged to acquire it and provided with opportunity to do so. Instructor K. B. Yim is considered an excellent candidate for a period of training and work toward an advanced degree at the University of Minnesota.

3. Younger staff members should be encouraged to engage in research and obtain broader experience. Short assignments with the Bureau of Forestry, National Forests, Central Forest Experiment Station, or provincial forestry departments would be of real value in making them better teachers and giving direction to their research.

Facilities

1. Designation of a section of the new building planned for the College as the School of Forestry would assist in gaining recognition within the institution and would be an added step in assuring that national leadership is attained. Such designation and existence of a forestry building or forestry section of a building is important to the development of staff cohesion and morale. It is strongly recommended.

2. The construction of a separate Forest Utilization Laboratory is recommended. The proposed size of this laboratory appears to be too small. It should be large enough to provide space for the necessary instructional and research equipment available and the additional materials recommended for purchase. A laboratory with about 3600 square feet of floor space would provide sufficient room for equipment and a laboratory-classroom in which most of the instructional work in Forest Utilization could be concentrated. The existence of a laboratory-classroom in the Forest Utilization Laboratory would be very convenient for instruction purposes and would decrease the pressure on other space.

3. The equipment and additional equipment needs of Forestry are treated in some detail in a further section of this report. Early purchase of the added items of equipment recommended for Forest Production teaching and research is recommended. The approximate cost of this additional equipment is about $6,300. Final recommendations on added equipment for Forest Utilization will be submitted following the writer's visit to the Philippines to obtain information on the laboratory equipment they have recently purchased and installed in their new laboratory. It is estimated that the approximate cost of this additional Forest Utilization equipment will be about $15,000.

4. The forest properties of Forestry are considered outstanding for both instruction and research. They are dealt with in greater detail in another section of this report. The need for several structures and equipment items to make the Kwangyang Experimental Forest an adequate field training center are covered in the section of this report dealing with forest properties.

Curriculum and Instruction

1. The writer is unable to judge the quality of instruction received by students. Coverage of subject matter material as indicated by course outlines appears to be excellent. The shortage of texts limits coverage. Although the library contains several copies of most of the texts used in United States forestry schools, these are not available to students for regular use. Several instructors have duplicated some of their instructional material. This has increased the amount of material covered. It is recommended that all staff members prepare duplicated material for student use in order to increase the amount of material covered and improve instruction. Acquisition of duplicating equipment by the College should make such duplication more practical and relatively inexpensive.

2. The Forestry curriculum appears to have excellent balance,

with the exception of too great emphasis on Wood Chemistry and Wood Preservation. Since all students are required to complete two semesters of Inorganic Chemistry and two semesters of Organic Chemistry, it is recommended that the total Wood Chemistry requirement be eliminated. Wood Chemistry is not a requirement for forest production students in United States forestry schools. Also, the potential application of wood chemistry knowledge by forest production students in Korea appears remote. In the case of Wood Preservation, one semester is considered sufficient to provide forest production students with a basic understanding of this field and give them as much material as they will ever need. The courses in Wood Chemistry and Wood Preservation should be retained in the course offerings, so they may be elected by students particularly interested in forest utilization.

3. The plan to require a full semester of field work of all students at the Kwangyang Experimental Forest is considered excellent and is strongly recommended.

4. A single curriculum for all forestry students is considered adequate for the time being. By reducing the Wood Chemistry and Wood Preservation requirement and possibly making other changes that would increase the number of elective credits available to students, some degree of specialization would be permitted and provided. Students especially interested in Forest Utilization could take the additional Wood Chemistry and Wood Preservation courses as well as other work in the College that would better prepare them for employment in the Forest Utilization field. Increasing available elective credits would permit Forest Production students to obtain added training in soils, botany, economics, engineering, and other areas.

5. If it develops that there are important employment opportunities for forestry graduates in the Korean forest products industries, consideration should be given to the development of a Forest Utilization curriculum, which would include less Forest Production and more Forest Utilization training.

6. Similar consideration should be given the very important field of soil erosion control. For the time being, soil erosion control would appear to be too limited a subject for consideration as a curriculum, even though such work is among the most important and critical effort facing the nation today. At present, soil erosion control appears to be a logical part of Forest Production, particularly if especially interested students are permitted additional elective work by reducing the total number of required credits.

7. The graduate course offerings of the Department of Forestry appear to be sufficiently abundant and varied to provide

good training for graduate students in Forest Production and Forest Utilization. If the graduate training program in forestry develops and the number of graduate students increases, consideration of additional graduate courses may be desirable.

Forest Properties and Field Training Center

This section deals with forest properties of the Departmentt of Forestry and the construction and equipment needs for a field training and research center on the Kwangyang Experimental Forest. Included are a brief description of these properties, discussions of some of the factors and complications associated with their operation, and a group of recommendations for the rehabilitation and construction of buildings at Kwangyang, Chusan, and Kwandung on the Kwangyang Experimental Forest.

Description of Properties

1. The experimental forest next to the College campus at Suwon consists of about 7 chongbos or 16 acres of plantations, arboretum plantings, etc. It is used extensively in teaching and research. Although somewhat damaged during the war, this area is still excellent for teaching and research and is very conveniently located.

2. A forest nursery area at the College of Agriculture, Suwon, consisting of about 3 acres, is available for nursery purposes, instruction in nursery work, etc. It is very conveniently located and satisfactory for the important uses made of it.

3. Chilbosan (Mt. Chilbo), granted to the College in 1928 by Kyonggi Do as an experimental forest. - Consists of 54 chongbos (136 acres); contains very little timber; is used in field planting and forest erosion control laboratories for students; located within a few miles of the Suwon campus and accessible without transportation. One forest guard is employed to prevent timber cutting and fire; he lives in a village near the area. No buildings are recommended by the Forestry Department for this tract.

4. Kwanaksan (located between Suwon and Seoul), granted to the College of Agriculture for administration and use for teaching and research purposes by Kyonggi Do in 1945. - Consists of 1696 chongbos (4,250 acres); most of timber stolen during war; area now in reproduction; occasionally used by Department of Forestry for teaching and research. One building is maintained in Anyang as headquarters for this forest property and two men are employed as forest guards to prevent timber cutting and fire. No buildings are recommended by the Forestry Department for this tract.

5. Wibongsan (Mt. Wibong), granted to the College by Cholla Pukto

province in 1920; - located near Chonju, about 110 miles south of Suwon; consists of 2917 chongbos (7,219 acres); most of timber stolen during the war; parts of area severely eroded, most of it covered with some type of reproduction. Only very occasional use is made of this property for teaching and research; students have been taken here for short periods of instruction in planting and soil erosion control in the past. Three forest guards are employed by the College to prevent timber cutting and forest fires. All of the buildings on this tract were destroyed during the war. No buildings are recommended for this area at present but the Department feels that at least an office headquarters will be needed in the future.

6. Kwangyang Experimental Forest, the former experimental forest of Tokyo University, located 10 miles northeast of Sunchon in Cholla Namdo province. - Consists of 15,778 chongbos (40,000 acres) and lies near the south coast about 175 miles south of Suwon.

Although parts of this forest were extensively damaged during the war, the majority of it escaped such damage and it is today probably one of the best forest tracts in all Korea. It contains a variety of forest types representative of Korean forests, many excellent coniferous and hardwood plantations, nut-tree plantations, and a few excellent old-growth stands.

Approximate Location of Forest Properties Used for
Teaching and Research by the
Department of Forestry, College of Agriculture

The volume of standing timber on the Kwangyang Experimental Forest is shown below:

Volume in Cubic Meters

Timber Type	Baikum Area	Chii Area	Total
Plantations			
Densiflora - Thun.	18,156	1,151	19,307
Koraiensis	4,093	1,017	5,510
Larch	63,348	-	63,348
Other conifers	1,009	-	1,009
Oak	2,097	-	2,097
Natural Stands			
Densiflora	101,026	4,816	105,841
Hardwoods	373,936	204,206	577,957
Mixed	99,964	26,102	126,066
Reserved	-	24,405	24,405
Total	613,847	261,697	875,544

The Kwangyang Experimental Forest has been completely type-mapped. These maps show the timber types and areas with good accuracy.

The Forest has been divided into four protection districts with protection headquarters or centers at each of the following points:

Name of Center	Protection Staff
Chusan (About 5 miles from Kwangyang)	3
Kwandong (About 5 miles from Hadong) (About 15 miles from Kwangyang)	2
Yongok (About 15 miles from Hadong) (About 25 miles from Kwangyang)	2
Chikjon (About 25 miles from Hadong) (About 40 miles from Kwangyang)	2

Kwangyang Headquarters (5 miles from Sunchon) has 3 staff members,

consisting of the Director and 2 assistants, who are concerned with the operation of the entire forest, maintaining contact with the gun officials in Kwangyang, carrying on research, operation of a small nursery, and arrangements for the field training of students from Suwon.

The Experimental Forest consists of two tracts, the Baikun Area, which includes the Chusan; Kwandong, and Yongok Protection Centers, and the Chii Area, which is protected from the Chikjon Protection Center. Near the Chikjon Center is a separate tract of "reserved forest" that is protected from the Yongok Protection Center.

At the Kwangyang Headquarters are three residences that are occupied. All are in a fair state of repair. The office, storage, meeting room, and guard room building at Kwangyang was destroyed.

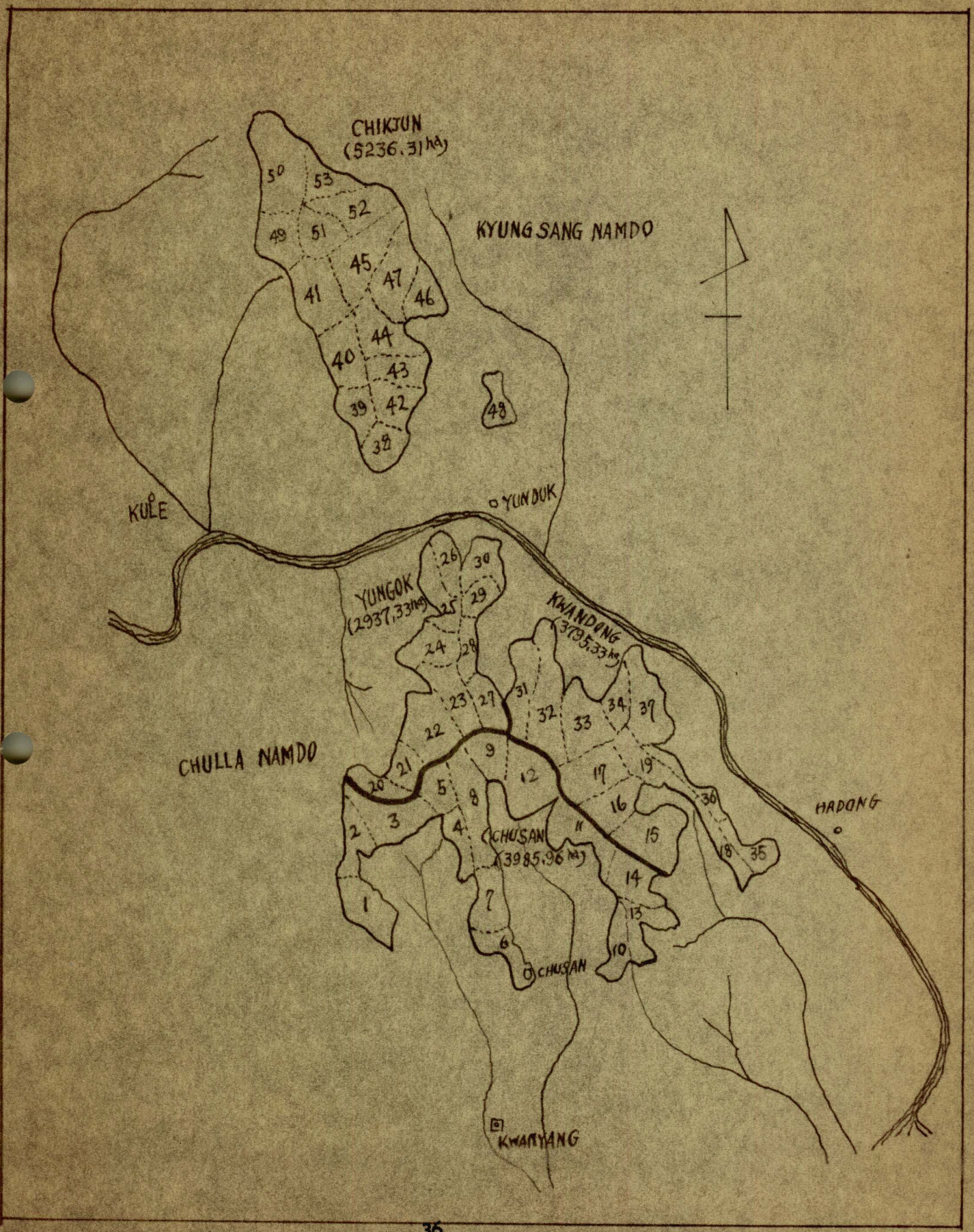
At the Chusan Protection Center is a residence in poor repair and a combination office-small dormitory-residence building in poor repair but readily repairable at low cost.

At the Kwandung Protection Center is a combined residence-office building in poor repair but capable of being repaired with relatively little investment.

At the Yongok Protection Center the combined office and residence was completely destroyed and only the foundation remains. Protection personnel live in the village.

Although time did not permit a visit to the Chikjon Protection Center, it is understood that the combined office or headquarters building and residence at this location was completely destroyed as at Yongok and that protection personnel live in a village.

Map of Kwangyang Experimental Forest Showing
Protection Districts and Compartments
(Areas Shown in Hectares)



Discussion of Factors Affecting Recommendations on Forest Properties

The forest properties owned or operated by the Department of Forestry, College of Agriculture, are very extensive in area. They are located so as to provide excellent coverage of Korean forest types and conditions for teaching and research purposes. The condition of these properties on the average is probably better than the condition of most Korean forest areas visited during the writer's stay in Korea, with the possible exception of Temple Forests, which are generally in excellent condition. The better protection given the College forest areas since the Korean War probably accounts for the generally good condition, compared to other Korean forests, of College owned or operated tracts.

The principal problem associated with these forest properties is that of protection, primarily from theft of timber and raking of needles, but forest fire damage is always a serious factor. Several serious fires have occurred on the Kwangyang Experimental Forest.

The forest properties owned or operated by the Department of Forestry, College of Agriculture, are far in excess of needs for teaching and research, particularly the large Wibongsan (7,219 acres) and Kwangyang tracts (40,000 acres). Their relative inaccessibility also poses problems of extensive use for teaching and research.

Whether the College can continue to manage all of these forest properties is a question difficult to answer. In favor of retention of these properties by the College is the fact that they are generally in better condition than surrounding forest lands in other ownership, due to better protection in recent years and possibly to the willingness of local villagers and rural people to cooperate with the College as compared to other owners. If the College can afford to continue to manage and protect these forests

as it is now doing, they will no doubt in time become more productive and may well be among the few examples of good forests available in Korea. Without the type of protection these forests are now getting they would no doubt become as denuded and non-productive as most of the forest lands in Korea.

It is the writer's understanding that the College will receive the income from the forest properties at Suwon, Anyang, and Chonju, when they again become productive and yield income. In the years before these forests yield much income, considerable protection costs will be involved. There would appear to be little question as to the desirability of continued ownership and protection of the Suwon and Anyang properties, because they are so conveniently located and the costs involved are small.

The principal questions concerning continued ownership and management of the College's forest properties would appear to be with the Wibongsan tract in Cholla Pukto and the Kwangyang Experimental Forest in Cholla Namdo.

The Wibongsan tract (7,219 acres) is presently relatively non-productive and it will be many years before it becomes income-producing. Although it may obtain some use for teaching and research in the future, such use would appear to be relatively limited as compared to that of Suwon, Anyang, and Kwangyang tracts. The principal question involved appears to be the extent to which the College of Agriculture has a national responsibility to help protect and develop forest tracts that will assist in demonstrating what can be accomplished in Korea. The apparent success of the Department of Forestry in thus far protecting and developing its forest properties more effectively than other owners, including the National Forests, is a factor that cannot be overlooked. If the Wibongsan tract could be returned to Cholla Pukto with provision for such future use as the College might wish to make of it, and with assurance that it would obtain as good protection

as it is now getting, such disposal would appear desirable.

As indicated previously, the Kwangyang Experimental Forest is today one of the few examples of fairly good forest tracts in Korea. The excellent experimental plantings of many species and natural stands provide outstanding demonstration, teaching, and research materials. The present volume on the Forest, 875,000 cubic meters, is about 3 percent of the total volume of available timber in all of Korea. The Forest is under complete protection and no cutting is now permitted or anticipated until such time as there is assurance that cutting of any type does not automatically become "clear-cutting and denudation". The existence of only these alternatives at present - "complete protection and no cutting" or "cutting and complete denudation" - may seem strange to foresters from other lands, but the experience on the National and Provincial forests, as well as on private forests, tends to give credence to this contention by qualified Korean foresters.

The Kwangyang Experimental Forest is far too extensive for the teaching, research, and demonstration needs or present and future use by the Department of Forestry, College of Agriculture. Its future management for income appears to be further complicated by the fact that under present laws none of the potential income will come to the College or can be used by it in the further management and development of the Forest. It is the writer's understanding that all income now goes and, unless some change is made in present laws, will continue to go to the National treasury. The College is now and, unless some change is made in the future, will continue to be an operating and managing agency for the National Government. It will have for such operation, unless some change is made, only the small funds made available to it for maintenance of the Kwangyang headquarters and employment

of the protection personnel previously listed. Here, as in the case of the Cholla Pukto tract (Wibongsan), the question of how great is the responsibility of the College of Agriculture in helping maintain, develop and protect a tract of forest land for the future of Korea is involved. As indicated previously, this responsibility cannot be dismissed lightly. One cannot simply say, "turn most of it back to the National Government or Province" because the condition of most National and Provincial forest lands is very unsatisfactory, particularly when located close to centers of large populations. If the College and Department of Forestry could be assured in the future of all or a large part of the income of the Kwangyang Experimental Forest, there would be less question relative to continued operation and development. If all or a large part of the future income could be assured for the College through change in present laws or, if the funds now coming to the College for operating this large tract could be substantially increased, retention and future operation of the entire Forest would appear more justified. The present condition of the growing stock, the high price of timber in Korea, and the certainty that timber will become more scarce as serious over-cutting continues nationally, would indicate that the Kwangyang Experimental Forest could become a profitable venture for the College in the future - if cutting can be done without danger of seriously damaging the tract, and if the laws governing disposition of timber and allocation of income can be changed to give the College all or most of the receipts.

Summary and Recommendations

1. The Suwon Experimental Forest and Arboretum, the nursery area, the Chilbosan tract, and the Kwanaksan tract are excellently located for teaching, research, and demonstration.

As they recover and become more productive, they will require more intensive management and possibly some increase in staff for this purpose. For the present, however, the protection being afforded them appears to be adequate.

2. The Wibongsan tract of 2,917 chongbos in Cholla Pukto poses several problems. Although it is owned by the College and any income from it would be available to the College in the future, it is understood to be relatively non-productive at present, and that it will require many years of complete protection and added investment in planting, erosion control, and management to rehabilitate it as a producing unit that would earn its own costs. Since present plans do not call for intensive use of this tract for teaching or research, no recommendations, insofar as the Seoul National University Cooperative Project is concerned, are included here. Its retention and future management by the College and Departmenttof Forestry are questions on which the writer is not in a position to comment.

3. The excellence of the Kwangyang Experimental Forest for field training in forest production, forest products, and forest erosion control is recognized by the Department of Forestry. The Department plans to increase its requirement for field training, possibly to the extent of requiring all students to spend one semester, during the junior or senior (3rd or 4th) years, at the Forest. Such increased use of the Forest for training and the planned increased use for staff and graduate student research is excellent and is strongly recommended.

4. As was true for the Wibongsan tract, the writer is not in a position to recommend as to the advisability of the College retaining and attempting to manage and protect under present arrangements the entire 15,778 chongbos of the Kwangyang Experimental Forest. Retention and an attempt to manage all of the tract in the future would appear to be closely tied to such arrangements as can be made with the National Government concerning use of part or all of future income. If the entire tract is to be retained by the Department of Forestry and protected and managed as it should be, then the National Government should either provide additional funds for this purpose or permit the use by the Department of all or the greater part of the income, when the situation becomes such that income production is possible and safe without liquidation of the Forest. It is recommended that this question of use of income from the Forest be made the subject of further discussions with the National Government groups concerned.

5. For the purpose of education and research by the Department of Forestry, the Chusan and Kwandung Protection Center areas, which involve somewhat less than one-half of the total Kwangyang Experimental Forest area, are more than adequate. Consequently,

it is recommended that rehabilitation efforts under the Seoul National University Cooperative Project be limited to providing the facilities necessary for administration, education, and research at the Kwangyang Office, Chusan Protection Center, and Kwandung Protection Center. Under this recommendation, which has been thoroughly discussed with Department of Forestry Head Dr. Hyun, the Kwangyang Headquarters Office would remain as it is in order to keep the necessary close contact with gun officials and provide an available headquarters; the field training facilities would be concentrated at the Chusan Protection Center; and the Kwandong Protection Center would be continued as it is. When it is desired to use the Kwandong Center for student training, this will be possible through use of tents, making only one student dormitory necessary.

6. The buildings recommended for the teaching, research, and management of the part of the Kwangyang Experimental Forest with which the Seoul National University Cooperative Project should be concerned are as follows:

	Estimated Cost
At Kwangyang Headquarters	
a. Build on the site and foundation of the destroyed building a combination office, meeting room, storage space, and guard room building.	
62 pyongs (about 2232 sq.ft.) at $200 per pyong	$12,400
b. Radio or telephone system to connect Kwangyang Office with Chusan and Kwandung Protection Centers, on which training and research facilities and activities will be concentrated	1,500
At Chusan Protection Center	
a. Construct one building to include a student dormitory (for 30 students), kitchen, dining room, and classroom	
70 pyongs (about2,520 sq.ft.) at $200 per pyong	14,000
b. Construct a combination staff office and quarters building	
20 pyongs (about 720 sq.ft.) at $200 per pyong	4,000
c. Rehabilitate the present dormitory and guard quarters into a laboratory and guard quarters	3,000

6. Continued

	Estimated Cost
Brought forward	$34,900
At Kwandung Protection Center	
a. Rehabilitate the present office and guard quarters and construct five wooden tent platforms	2,000
Total cost	$ 36,900

7. Two items of equipment considered essential for use in the management of the Kwangyang Experimental Forest, for training, and for research, particularly for the Chusan and Kwandung Protection Districts, are a Jeep with small trailer and gasoline motor driven 5KW electric generating plant. Except for the jeep and trailer, which under present Republic of Korea policies could not be procured with aid funds, these items, together with tents, which will replace dormitories proposed for other places on the Forest to be used for student training, are included in the "Necessary Equipment List" for the Department of Forestry.

Forest Production Equipment

For the Department of Forestry

The Department of Forestry was fortunate in obtaining an earlier sizable allotment of funds from UNKRA for the purchase of considerable urgently needed equipment. The majority of this equipment was for instructional work in the fields of forest measurements and forest surveying. Through a grant from the Bureau of Forestry, Ministry of Agriculture and Forestry, considerable equipment and a laboratory for the important forest tree genetics research of Forestry Department Head, Dr. Hyun, were obtained. Some of the equipment obtained from these sources is used in connection with instructional work in silviculture, forest erosion control and forest products. In addition to the above equipment, which is now available, a number of equipment items have been approved for purchase under the Seoul National University Cooperative Project but have not yet been received.

As a result of these grants and purchases approved under the Seoul National University Cooperative Project, the Department of Forestry has the majority of the equipment needed in the fields of forest surveying, forest measurements, and forest tree genetics - for both teaching and research. In the forest production fields of silviculture, forest management, forest economics, and to some extent in forest tree genetics, however, there are a number of important equipment items that should be purchased. These important additional items have been carefully discussed with Dr. Hyun and Dr. Shim. Although the additional equipment suggested for purchase is far from what the Department would like and feels to be necessary, it is the writer's feeling that it is adequate for the time being. These items of additional equipment recommended are shown in the appended list. Their total approximate cost is slightly over $6,000.

It is recommended that they be immediately ordered for purchase.

Recommended Additional Forest Production Equipment

for the Department of Forestry

Note:

Catalog No., Item No. in catalog, and exact price are given when an item is available from equipment dealers. Approximate prices only are given for items to be specially fabricated according to details provided by the Minnesota School of Forestry. All items are to be as indicated or equivalent. All items are for instruction and research.

For Forest Production and Forest Erosion Control

Item No.	Quantity	Description, Number, Source, Price per Item	Total Cost
		Items 1-6 are repairs and added equipment for International Equipment Co., Boston 35, Mass., Centrifuge Size 1, SBV, which is available but not usable without these parts. Items 1-6 are available from the International Equipment Co.	
1.	1	Tachometer, International Indicating, for Size 1, SBV Centrifuge, equipped with Conical and Regular Heads Item No. in catalog is 748	$21.50
2.	1	Autotransformer, Type V16, 115 Volts, A.C. only for Model SBV. Item No. in catalog is 1790	88.00
3.	1	Head 8-place, for 15 ml. metal shields No. 302. Trunnion rings attached. Without metal shields. Item No. in catalog is 225	26.00
4.	20	Metal Shields, 15 ml. Cornell style, for Heads No. 225 and 811. Item No. in catalog is 302 $1.15 each	23.00
5.	1	Angle Head, 20 place, 15 ml. Takes 20 No. 302, 15 ml. metal shields. Item No. in catalog is 811	130.00
6.	100	15 ml. International Lusteroid Centrifuge Tubes. No number or price given but available from above company. Price for 20 ml. tubes of same type is given as $.085 per tube, so $.08 is estimated as price of 15 ml. tubes	8.00
7.	1	Barometer, Mercurial, Cenco, Range 600-800 mm for altitudes from 0 to 4000 feet. Scales and verniers of stainless steel. Catalog No. J150. Item No. in catalog 76890, Central Scientific Co.	48.50
8.	10	Screw Micrometers at $9.00 each. Available from Braun-Knecht-Heimann Co., 1400 Sixteenth St., San Francisco, 19, Cal. Item No. in catalog 72658	90.00

Item No.	Quantity	Description, Number, Source, Price per Item	Total Cost
9	4	Dunlap Sprinklers, Oscillating type, Covers Rectangular area up to 1700 sq. ft. Sears, Roebuck & Co., Los Angeles. Item No. in catalog 9H6907 At $8.25 each	$33.00
10.	8	Lengths of plastic garden hose, each 75 feet long, with storage reels. Item No. 99H06924 in Sears, Roebuck & Co. catalog. At $8.45 each	67.60
11.	1	Homart Convertible shallow well jet pump. 1 horsepower motor, with 48 gallon tank, 3-way pressure switch, Dual Voltage. Item No. 42HM3043W in Sears, Roebuck & Co., catalog	174.50
12.	1	Water mist atomizer, similar to one in Minnesota School of Forestry greenhouse, for use in producing high humidity in greenhouse benches or inclosed seedbeds for rooting studies on coniferous cuttings. Specifications to be furnished by Minnesota School of Forestry	250.00
13.	2	Christen Hypsometers for student demonstration and research. Specifications and source not available; to be supplied by Minnesota School of Forestry	100.00
14.	2	U.S. Forest Service Hypsometers for student demonstrations and research. Specifications and source not available; to be supplied by Minnesota School of Forestry	100.00
15.	20	Fluorescent tubes for Lamp #36540, Length 18 inches, 15 watts. Lamps were purchased without bulbs $.75 each	15.00
16.	1	Electric calculating machine (Friden or equivalent)	400.00
17.	1	Hand operated calculating machine (Friden or equivalent)	250.00
18.	1	Electric adding machine with supply of paper tape	200.00
19.	1	pH Meter, Laboratory Type, Beckman Model G. Central Scientific Company, Catalog J150, Item No. in catalog 21075	375.00
20.	1	Rotary Microtome. AO Spencer Rotary Microtome with knife holder, No. 942 knife, No. 961 Back, No. 955 handle, three Object Discs 7/8", 1-1/8" and 1½" diameter and No. 969 oil can. American Optical Company. Item No. in catalog 815	400.00
21.	1	Microtome knife hone, water or oil, Diamond Central Scientific Co. Catalog No. J-150. Item No. in catalog 68315	22.00

Item No.	Quantity	Description, Number, Source, Price per Item	Total Cost
22.	1	Microtome knife and back for sliding microtome Central Scientific Co. Catalog No. J-150. Item No. in catalog 68221	$ 25.00
23.	1	Microtome knife handle for holding No. 68221 knife. Central Scienfific Co. Catalog No. J-150. Item No. in catalog 68260	4.00
24.	30	Budding and pruning knives. Bartlett Manufacturing Co., 3003 East Grand Boulevard, Detroit, Michigan, Catalog No. 34 (1954). Item No. 730. At $3.60 each	108.00
25.	30	Pocket stereoscopes for aerial photogrammetry work. Similar to those used at the Minnesota School of Forestry. Source and specifications to be provided by Minnesota School of Forestry. Estimated cost approximately $6.00 each	180.00
26.	1	Sectional aluminum or magnesium ladder for tree breeding work, cone collection, and pruning work. Similar to one in Minnesota School of Forestry. Total length of about 40 feet, in 6 or 8 foot sections. Specifications and source to be provided by Minnesota School of Forestry.	180.00
27.	1	No. 1-WE Tree Pruner Head Section. 30" overall (wt. 2½ lbs) Bartlett Manufacturing Co., 3003 East Grand Boulevard, Detroit, Mich. Catalog No. 34 (1954) Item 1-WE page 3.	9.75
28.	1	No. 44-WE Saw Head Section. 30" overall (wt. 1½ lbs) Bartlett Manufacturing Company, 3003 East Grand Boulevard, Detroit, Mich. Catalog No. 34 (1954) Item No. 44-WE, page 3.	7.10
29.	1	Interval Timing Clock, Improved Form. Central Scientific Co., Catalog No. J-150. Item No. 73405 in catalog.	9.95
30.	1 set	Weights, analytical, Rhodium-plated, Class S, 100 gram. To use with analytical balance available in Department of Forestry but which has no weights. Central Scientific Co. Catalog No. J-153. Item No. in catalog 8050,#2	75.05
31.	30 pkgs.	Blue print paper, 8 x 10 inches, 24 sheets per package, Item 88482 in Central Scientific Co. catalog J-150. At $1.30 each	39.00
32.	1	Humidity Cabinet, Gravity Convuction for controlled humidity and temperature incubation. Item L-82 in Soiltest Incorporated Company, 4522 W. North Avenue, Chicago 39, Ill. catalog. No price listed in catalog and price list not available. Price estimated	800.00

Item No.	Quantity	Description, Number, Source, Price per Item	Total Cost
		Equipment for Kwangyang Experimental Forest	
33.	1	5 Kw. gasoline - motor driven electric generator for Chusan Protection Center, where student dormitory will be constructed	$2,000.00
34.	5	J. C. Higgins Cabin-wall tents with full screen front. Size: width 9½ feet, length 11-3/4 feet, weight 72 pounds. To be erected over wooden bases provided by Department of Forestry at experimental Forest location. To be used for part of the student training program. Sears Roebuck & Co. Item No. in catalog 6RT7719L, at $78.95 each	552.65
35.		Chemicals for use in furthering the important tree breeding research program of the Dept. of Forestry	175.00
	2 ounces	Colchichine Alkaloid, USP, XIV powder, from Mallinkrodt Chemical Works, 27 Spruce Street, New York 38, New York. Estimated cost	$100.00
	5 pounds	Sodium hypochloride	20.00
	2 "	Gum mastic	10.00
	2 "	Collodion	3.00
	2 "	Clove oil	4.00
	10 "	Tertiary Butyl alchhol	20.00
	2 "	Duparol	5.00
	1 "	8-Hydroxyquinoline	10.00
			$175.00
36.	200 gal.	Penta Grease, at about $2.00 per gallon. To be used in the treatment of the butt and groundline parts of poles to be installed in the Kwangyang Experimental Forest telephone line. Such treatment can be made as the poles are set and will more than double their service life. Obtainable from Chipman Chemical Co., Memphis, Tennessee	400.00
		Total approximate cost of forest production equipment	$6,387.60

Forest Utilization

Equipment for the Department of Forestry

In contrast to the availability of equipment and relatively small additional needs of the Department of Forestry in the Forest Production field is the situation in the Forest Utilization or Forest Products field. With the exception of a few items obtained from early UNKRA procurements and several pieces of equipment approved for purchase under the Seoul National University Cooperative Project, the Department is very poorly equipped for training and research in the forest utilization field. As indicated elsewhere in this report, forest utilization training and research are of great importance in a country such as Korea which has limited forest resources and must utilize these resources in the best possible manner if it is to meet its many present and potentially greater future demands for wood products of all types. There is abundant room for research even in connection with such common everyday products as fuel, which is reported to make up about 80 percent of materials taken from Korean forests. Materials of this nature and origin will continue to be the major fuel available for the 73 percent of the population residing in villages and for many residing in towns and cities.

The forest utilization or forest products equipment needed by the Department of Forestry must be adequate for demonstration and some laboratory work for undergraduate training, for graduate training, and for staff research. Much of the equipmentt needed does not exist as prefabricated laboratory-size units. It must be fabricated according to working drawings prepared by experienced individuals or available from groups that have recently completed similar installations. One such group that has just completed the construction of a forest products research and training laboratory is the Philippines Government, at the

School of Forestry, University of the Philippines. The writer has been requested to return to the United States by way of the Philippines in order to visit this recently completed installation and to obtain there as much equipment design and specification data as possible. If a substantial amount of design information can be obtained in this manner, it will greatly speed the manufacture of the needed equipment and undoubtedly result in overall lower costs therefor.

In order to obtain at least a rough estimate of the approximate cost of forest utilization equipment necessary for teaching and research at the Department of Forestry considerable work was done at the Minnesota School of Forestry before the writer came to Korea, and much added discussion and consideration have been given the matter since coming to Korea. Plans for the laboratory and the minimum necessary equipment have been thoroughly discussed with Dr. Ryan and Dr. Shim, Head and Professor in Forest Utilization, respectivaly, of the Department of Forestry. These estimates indicate that the cost of the necessary equipment for forest utilization instruction and research will be somewhat over $15,000. This should be regarded only as a rough estimate, for general guidance. This figure may be changed somewhat by what the writer finds to be available and satisfactory during his visit to the Philippines.

The equipment list for the Department of Forestry forest utilization laboratory will be submitted to Dr. A. E. Schneider, Chief Adviser in Korea, Seoul National University Cooperative Project, following the writer's visit to the Philippines in November, 1956.

APPENDIX A

Research and Graduate Training*

by

Frank H. Kaufert, Adviser in Forestry
Seoul National University Cooperative Project

It is a genuine privilege to have an opportunity to address the Korean Agricultural Society on this occasion. My stay in your country has been too short to permit me to address you on specific research or education problems. Through your helpfulness and assistance I am gradually gaining a better understanding of some of your problems in education and research.

Because of my lack of thorough acquaintance with and full understanding of your problems, this discussion will be devoted to a consideration of some basic principles of education and research, of their close relationship, and of their interdependence. These relationships and principles apply generally and they appear to be especially important in Korea at this time, when you are in the process of rebuilding and reorganizing after a very destructive war. They are problems to which attention is being given in all countries where education is emphasized, as it is in Korea, and where research is regarded as an important means of solving age-old and difficult problems. Through education and research you hope to develop new methods, new and more materials, and better understanding.

Research based on education is today the foundation for more and more of total economy of nations. The developments coming from

*Presented on October 1, 1956 to the Korean Agricultural Society.

research lie back of much of the progress gradually giving rise to improved living throughout the world. The communist nations appear to recognize the importance of research even more than do the free nations. They appear to support research liberally and encourage it. To remain free and strong it thus becomes the obligation and responsibility of free nations to forward their research with even greater vigor and support. There appears to be little doubt but that we must engage in more and better research on every aspect of our economics if we hope to solve long-existing problems, better the living conditions of our people, and remain free.

Investment in education and research is like investment in insurance, it is protection and preparedness for the future. Education and research have become such important elements of national well-being and preparation that we must invest in them almost without regard to present strength, health, and prosperity. Although they may appear to be expensive and beyond our means at the moment, education and research are still the cheapest investment for the future that industries, societies, and nations can make.

The Foundations of Strong Research

The development of strong research depends first of all on the possession of firm convictions that research is worthwhile and essential; it depends on organization and administration; it depends on adequate financing; it is favored by full cooperation between research personnel and agencies engaged in research; and last, it is completely dependent on the availability of a supply of well-trained, dedicated, and imaginative

workers.

Productive research cannot develop and flourish unless there is a strong conviction on the part of those making policies, whether this be the management of a company, department head, or government, that research is wanted, needed, and is a sound investment. Individuals and governments lacking convictions regarding the worthwhileness of research are fortunately becoming less common. Large companies that have not invested in research have seen their competitors grow and prosper at their expense. Unless nations possess abundant supplies of raw materials, such as oil, their chances of improving their position among nations and of bettering the welfare of their people without research are indeed small.

Organization is important because research workers must have equipment, facilities, and considerable freedom for greatest accomplishment. Although considerable research is being done in countries where freedom does not exist, there is question whether in the long run such research can be as productive as in a free society, with sufficient organization to free productive research workers from many of the details that tend to dilute their efforts. Although the need for organization is great, it sould involve direction and not dictation.

Research is generally considered to be expensive. Some individuals and governments even consider it a luxury. There is little question regarding the cost of research. In the United States today about $5,000,000,000 is invested in research of all types, governmentsl, industrial, and other. This is about 1.2 percent of the national income.

Granting that this is a considerable sum of money, look at what it has bought and continues to buy in improved general welfare and security as compared to even larger sums spent for such things as advertising, crop price supports, benefit payments, etc.

Without the maximum of cooperation and coordination between research workers and those responsible for policies and organization, there can be much wasted effort and few accomplishments. Such cooperation or coordination come generally not only through organization. They must come in the end from the research workers themselves. With opportunity to exchange ideas, most qualified research workers will not purposely engage in duplication. Where they do, it is usually for the purpose of checking the results of another's research. Such effort is desirable in many instances and may be as productive as original research.

Last and very important in this listing of the foundations for strong research is the availability of a supply of well-trained, dedicated, and imaginative research workers. Without highly qualified personnel, no amount of conviction, organization, financing, or cooperation will make for productive research. The research programs of many private companies in the United States as well as those of smaller countires have broken down and have been abandoned because of failure to recognize that accomplishment in research requires highly trained, imaginative, energetic, and well-paid personnel. Research is not a magic wand. It cannot be purchased ready-made for a particular situation. It must be slowly and carefully developed through proper attention to the foundations on which productive research is known to rest. High on this list is the need for

well-trained and qualified research personnel. The old saying " you can buy hands but not brains" certainly applies in research.

The Source of Research Personnel

There is but one certain, permenent, and satisfactory source for qualified research personnel. This is the graduate training program of the college or university. A nation, such as Korea, may need to resort to some training in other lands, to importation of research specialists, and to employment of less highly trained personnel as temporary measures. But if it is to embark on a long-range and permanent research program, it must at the same time insure the future and productivity of such a program by assuring the thorough training of an adequate number of high quality research workers.

In the same way that progress depends on research, the quality of research on the caliber and training of research personnel, so the caliber and training of the research personnel depends on the staff members responsible for the training of graduate students.

Graduate training is more specialized and expensive than professional training to the level of the bachelor's degree. All teachers need to be energetic, inspiring, and imaginative. But those training graduate students must, in addition, be original thinkers and be engaged or have been engaged in significant or important research.

There is no substitute for what is commonly termed "know how". Research experience and accomplishment are as important in graduate training for research as are tools and experience to the skilled craftsman. A nation dedicated to education and convinced that research is one of the

important tools in economic progress, must provide for the training of a considerable part of the necessary personnel in its own institutions - personnel trained to work under existing conditions and in the solution of problems confronting the nation.

The Application to Korea

These basic principles and the close relationships between research and advanced training at the graduate level should receive careful consideration in your development and rebuilding program. It is appreciated that many or most of the points made below are not new, that you have accomplished or are in the process of accomplishing some of them, and that you recognize the important of others. However, I am going to take advantage of the opportunity you have given me to repeat the more important of these:

1. Since you are interested in and dedicated to the development of a stronger research program, because of its present and potentially even greater benefit to the Nation, then there must be emphasis on and development of strong graduate training to provide the needed research personnel.

2. Since graduate training programs are expensive, it would appear logical to concentrate your efforts in a single institution, as has been done in the State of Minnesota at its University. Graduate training is one field of training where diluted or inadequate effort is apt to be wasted effort.

3. If graduate training is made a major staff responsibility and grows as it should, larger departmental staffs, adequate equipment, and good training facilities will be needed. There should be no compromise

with quality in graduate training, the best will in the long run prove cheapest.

4. Staff members concerned with graduate training will need relief from heavy undergraduate teaching loads and must be interested and actively engaged in productive research. If they are to effectively carry out their research-worker training function, research on the part of graduate training staff members must be recognized as an important and necessary activity. The research contributions of graduate staff and students can appreciably increase your total research program. In case of fundamental or basic research, they may well make the only contributions because it may well be that for some time to come most of the country's research will and must be applied or devoted to the solution of practical pressing problems.

5. This dependence of research on graduate training means that your research and graduate training programs should be closely tied together, even though they are in different governmental agencies. You now have rather close cooperation and good working relationships in some fields. These need to be developed further and extended to all fields. Your competent and well-qualified research personnel must be interested in, encouraged, and permitted to assist in the training of graduate students. In turn, your graduate training staff must be interested in, encouraged, and permitted to carry on research.

6. In a country where research is so urgently needed, the emphasis for a long time to come should be on how to get more done, rather than on who will do it. You have more problems and challenges in every field than

can be solved by existing personnel.

7. To accomplish the necessary coordination of effort, you should develop a number of research councils or committees qualified to review and advise individuals, agencies, and the government on the needs, direction, and development or research.

APPENDIX B

Some Impressions of

Korea's Forests and Forestry Problems*

Frank H. Kaufert, Adviser in Forestry
Seoul National University Cooperative Project

I appreciated your invitation to address you on the subject of Korea's forest and forestry problems. I must admit that I accepted your invitation with a great deal of hesitation because I do not feel qualified to speak with any degr e of authority on this subject. Three months is far too short a time in which to learn and grow to understand a great deal about the forests of such a large and mountainous country as Korea. I wish that it were my privilege and opportunity to spend a longer time in your very hospitable country. Possibly in a few more years of travel, study, and discussion, I could address you with more authority and knowledge.

You have provided me with opportunities to see Korean forests that are deeply appreciated. Through your invitations and hospitality it has been my privilege to travel quite extensively in all provinces except Cheju. I am happy to have this opportunity to express to the Bureau of Forestry, Central Forest Experiment Station, Department of Forestry, Suwon College of Agriculture, OEC Forestry Section personnel, Provincial foresters and soil erosion personnel, and forest products industry representatives, my wholehearted thanks and appreciation for your many favors and cooperation. What understanding I have acquired of your problems, of your forest resources, and of possible solutions

*Presented on November 3, 1956 to the Seoul Forestry Association

to these problems have come largely from you. Although my major concern while in Korea has been with forestry training, graduate study, and research, I have considered it essential and important to obtain at least a broad, general knowledge and picture of forestry generally. Fortunately, Dr. A. E. Schneider of the Seoul National University Cooperative Project, Dean Cho of the Suwon College of Agriculture, Dr. Hyun of the Department of Forestry, Mr. Hamar and Mr. Kirkham of OEC, and Bureau of Forestry personnel felt the same way. They combined to give me "the works", a term we use in the U.S. to indicate that one has been subjected to intensive treatment. This fact makes my appearance before you today somewhat less critical as far as I am concerned. Unless they have been good teachers and I have put the many complex pieces of the lessons learned together in a manner that makes good sense, then they have partially failed as teachers and I have not been a responsive student.

Let me begin my discussion by expressing my reactions to what I have seen and learned. Much of this will be common knowledge to you. However, its repetition will indicate to you how the general forestry picture looks to one acquainted primarily with North American and European forestry. Also, repeating the facts learned and giving my impressions of what I have seen will provide the basis for the conclusions drawn and recommendations made. The most important of these facts and impressions are as follows:

1. The management of forest land for greater production appears to me to be only slightly less important to Korea than the growing of

food. There is some question in my mind whether it is better to be well-fed but cold and poorly housed, or whether it is better to be warm and well-housed and possibly somewhat less well fed. Because your objective is to be both well-fed, warm and well-housed, forestry and the management of your forest lands for greater production should rank with agriculture as your two most important national efforts.

2. I am not well enough acquainted with agriculture and your agricultural production to know your real potentials for food production, but there is little question in my mind regarding the potential of your forest land resources. When and if they are brought to a high state of productivity, they could produce all of your needs for forest products of all types. In time, under favorable conditions, one might even visualize a surplus of forest products. I grant that such a possibility may be far in the future and that many, many problems must first be solved, but the potential is everywhere apparent.

3. You have one of the highest percentages of forest land of any country in the world. With 73 percent of your land classified as better suited to growing forests than to agriculture, 6,469,000 out of a total of 8,854,000 chongbos, the total area, if productive, even though much of it is steep and relatively inaccessible, is enough to care for all your needs.

4. The poor condition and present low productivity of your forest land resource is indicated by the fact that the total timber volume has been estimated at not more than 51,800,000 cubic meters, about 8 cubic meters per chongbo. This is about 1 cord per acre, the terms in which we measure cubic volume in the U. S. In the U. S., stands

of much less than 6 to 8 cords per acre are considered unmerchantable.

5. Total or partial denudation of forest lands, through many years of over-cutting and raking of needles and leaves for fuel and compost, is everywhere apparent. With relief from cutting and raking, a large part of this land will recover and produce forest products of some type. However, much forest land has been so seriously over-cut and denuded that planting must be carried on, even on a larger scale than at present. The planting of over 1,000,000 chongbos of denuded forest land is a tremendous job that lies ahead.

6. The country's real tragedy lies in the estimated 600,000 chongbos of forest land so seriously over-cut, raked, and mistreated, that expensive erosion control may be the only solution to its recovery. These badly eroded areas are serious not only from the forestry standpoint, but from the point of view of agriculture as well. They are certainly partially responsible for the damage to and loss of 20,000 chongbos of paddy lands annually. They are largely responsible for the building up of stream beds with silt and sand, which makes the job of managing the agricultural lands more difficult each year. They lie as the basis for some of Korea's serious floods, such as those witnessed during the past summer in Kyongsang Namdo and other parts of Korea.

7. Although your literature, and the many reports on Korean forests, indicate your almost complete dependence on the forests for fuel, this fact was made particularly clear in the speech made by Bureau Chief Kim Yung Joon before Forest Erosion Control personnel at Kyongju. He pointed out that of your total fuel needs of about 12,000,000 tons,

usage was as follows:

By cities	13 percent
By towns	11 "
By villages	73 "
Other	3 "

Even though you were successful in substituting other fuels for all of the forest fuels now used in cities and towns, something that will be difficult to achieve, your forest lands must still produce about 3/4 of Korea's total fuel requirements to satisfy the needs of the villages. The villages are now and probably always will be completely dependent on forest lands for fuel.

8. The subject of fuel, which is reported to make up over 80 percent of all forest products produced in Korea, brings up the question of over-cutting. After my recent trip to Sunchon and Kwangyang with Dr. Hyun and seeing the tremendous amounts of fuelwood and sawlogs piled at railroad sidings and stations, I can better understand the fears of your foresters. Without actual figures on your total timber growth and annual cut, it is hard to say how serious this overcutting is, but it certainly looks like it must be many times the available growth.

9. You are engaged in a tremendous planting program. The growing and planting of between 300,000,000 and 400,000,000 seedlings annually is impressive and will result in healing some of the wounds made by over-cutting and raking. Although one so new to your country as I cannot hope to know all of the complications and problems involved in the growing, getting planted, and then protecting from too-early cutting these millions of seedlings, this program certainly is essential and all-important to your future. This large planting program will give

you a good opportunity to improve your future stands, by introducing better species.

10. It has taken me time to gain an understanding of your protection problem. In the United States "forest protection" means protection from fire, insects, and diseases. In Korea, fire, insects, and diseases are important, but protection from too-early cutting by man is certainly the far greater problem. It is hard for me to accept the fact that only two alternatives are available to you - "complete protection and no cutting" or complete liquidation and denudation. However, your able foresters have pointed out so many striking examples of this in the three months I have travelled in Korea, that I too am growing convinced.

11. Few of the many things you have shown me have impressed me more than the reproductive potential of red pine (Pinus densiflora). Without the persistence of this species your mountains would be in far worse conditions and your villages certainly would be even harder pressed for fuel.

12. The potential of Acacia, known in the U. S. as black locust, in the Korean forest economy is great and deserves much greater attention. In this short period of three months, I have been converted from an Acacia critic to an Acacia enthusiast. I have seen its amazing growth and good volume production even when cut anrually; the use of its high density wood for fuel; its ability to heal gullies and grow on many soils; and its production of not only wood for fuel but, in its foliage and seed, fine food for chickens and rabbits.

13. It has been my good fortune, through your ever ready assistance,

to see good timber stands and good timber growth in Korea as well as understocked areas, denudation, and serious forest erosion. This has convinced me that you have many fine timber trees; in addition to red pine and acacia, pitch pine, Korean white pine, black pine, larch, alder, several oaks, and many other species. You have the rainfall and climatic conditions for excellent timber growth. Many of your soils have been depleted and their potential reduced by continual raking and erosion, but most of them will grow some type of tree that will make fuel. With protection from over-cutting and raking, I see no reason why in time producing forests should not cover all of your forest lands.

14. Turning now to the subject that was my primary reason for coming to Korea, forestry education, I must admit that I am as deeply concerned with its future as with the future of your forests. With eight forestry schools at colleges or universities, you have more forestry training than any other country in the world with a similar sized forest resource. It has only been possible for me to work closely with the Forestry Department of the Suwon College of Agriculture, but I have visited one provincial school and one private school. The abundance of your forestry training disturbs me. Do you need and should you support so many schools? In Minnesota, which has somewhat more forest land than/Korea, and is about the same size as we have but one school.

15. My deep interest in forestry research has caused me to give special attention to such research in Korea. With the exception of a few bright spots, such as the research on forest tree genetics, mushroom production, and some aspects of soil erosion, the amount and quality of your research does not appear to me to be what is needed in Korea.

16. My first reaction to your timber importing program was critical but, as I have learned, its tremendous importance has become apparent. A country that is rebuilding needs large quantities of timber for construction. Without your import program, over-cutting would unquestionably be even greater than it is at present.

17. My last observation has to do with the close relationship between agriculture and forestry in Korea. Your Ministry of Agriculture and Forestry is well-named. It recognizes the differences that exist between them but at the same time emphasizes their close relationship. It appears to me that agriculture and forestry in Korea must always be closely associated for both to flourish. The water for most of your agriculture comes from forest lands. When forest lands are mistreated they do not yield a uniform water flow; then water damage to rice paddies and floods result. The deposit of infertile upland soil on rice paddies makes difficult the necessary and continual building of humus or organic content, most of which in turn comes from the forests. A prosperous and productive Korean agriculture is impossible without green mountains and pruductive forest land.

You have graciously and attentively listened while I have related observations that to you are no doubt as old as your contacts with forestry. To be on the safe side and escape being called just another foreigner who has learned it all in a few months and is too free with advice and criticism, I should stop at this point and conclude by showing a few slides. However, at the risk of being called whatever name you reserve for such people in your fascinating and interesting language, one that I regret to say I have failed to absorb in my short

stay, I will say "here goes" and proceed to do what my sounder judgement tells me to avoid. "Here goes" is a term we use in English when we are about to plunge into ice cold water.

1. In the U. S. agriculture and forestry have always been associated in what might be called a "big brother" - "little brother" relationship. "Big brother" is well taken care of and through tremendous pressures gets what he wants, whether or not it is deserved. "Little brother" has to fight harder for what he gets and just isn't strong enough to get his full share of what is deserved and needed. The tremendous importance of your forests to agriculture, the real danger that a large part of your people could suffer from fuel shortage if there is further exploitation and denudation, and the certainty that you will have a growing need for all types of timber products, indicates to me that in Korea agriculture and forestry must be on a "big brother" - "big brother" basis. The "big brother" - "little brother" relationship may be OK (to use the most common American term in Korea today) in the U. S. where agriculture is so much more important than forestry, but in Korea they appear to me to be of equally critical importance to your future.

2. I have not previously commented on your more than 18,000 Village Forestry Associations. I gather from what I have learned and seen that some of them have done outstanding jobs, many have done something, but that too many have done very little. It is my sincere hope that you will not grow discouraged with the progress made by these Associations and will increase and further emphasize your program with them. Frankly,

I see little possibility of success for your total forestry program in Korea unless the 18,000 Village Forestry Associations do the job that must be done, with the help, encouragment, and direction of the Bureau of Forestry, Central Forestry Association, and provinces. In the U. S. we have an important forest fire control program. Our fire losses in one year, 1932, were greater than the total timber cut and used. The Federal and state governmental bodies responsible for fire prevention and protection in the U.S. have found these programs only as effective as the local people, the equivalents of your Village Forestry Association, have been willing and able to make them. In the past 10 years we have made more progress in fire prevention, through what we call county Keep Minnesota Green committees, than ever before. This cooperative effort has at times been discouragingly slow, it has had many successes and failures, but we are convinced that these local committees, rather than regulations, laws, and paid fire fighters, is the way to get the job done. If I were to name a single organizational feature of Koresn forestry that has particularly impressed me, it would be your "Village Forestry Associations". Your Bureau of Forestry, provincial foresters, and Central Forestry Association are to be complimented on the work that has been done in setting up the Village Forestry Associations; they are an example of "democracy in action". Don't be discouraged if progress through them is slow. Democracy is slow and often wasteful. But, in my opinion, it is the only way in which you will be able to accomplish the important job that must be done nationally in rehabilitating your forest lands.

3. Much of the success of your forestry program will depend on

accomplishments in education; education at the local level, in the schools and Village Forestry Associations. Such education is slow and difficult, but it may be the most important educational effort. The importance of forestry and of forestry to agriculture needs emphasis in the primary and middle schools as well as high schools. I do not know your plans regarding forestry and soil erosion extension work in the villages, but I hope you are planning such a program and that you tie it closely to agricultural extension. Here too, there is need for the "big brother - big brother" relationship if your completely interdependent agricultural and forestry programs are to succeed. Your growing 4-H Clubs could well be encouraged to take on forestry and erosion control projects.

4. I am not fully acquainted with what you have or plan with regard to the gathering of information on your forest resources, amount of timber cut, general condition of your forest lands, etc. For long-range planning and an early evaluation of how seriously your forests are being over-cut, the success of your soil erosion control program, and the success of your plantings, you need some type of survey, preferably one that is repeated at regular intervals. This is the only way that progress or loss can be measured.

5. As mentioned earlier, what I have seen and learned, together with my association with Bureau foresters, Mr. Kirkham, and Dr. Schneider, have made me an Acacia enthusiast. Widespread and wholesale planting of Acacia appeals to me as one way of providing the villages with an early supply of fuel, as well as animal food, so the mountain slopes may be rested from raking and over-cutting. Such a program would also

give your plantings of more valuable species - conifers, alder, oaks etc. - a chance to grow and produce real volume before being cut. Also, I feel strongly that foresters and agricultural experts should jointly examine Acacia plantings for the lower slopes and hills on which agricultural development is planned. Possibly Acacia would produce food for livestock, as well as badly-needed fuel, in greater quantity than other plants.

6. Because my fields of forestry have been concentrated on education and research, I may be somewhat prejudiced on this point. However, I am convinced that with the exception of the few fields mentioned, your research programs in forest production, forest erosion control, and forest utilization are completely inadequate. Research is insurance for the future. Unless you invest in it today, you will not have in the future the protection and guidance for improved practices that it affords. Research, like insurance, is not just for the wealthy or rich. It is even more important for those with fewer means and resources. You need more and better research on every aspect of forestry, from the development of better and faster growing trees, to cheaper and better soil erosion control methods and plants, and to the improved utilization of what your forest lands now produce. As a firm believer in the possibilities in research, I feel that such things as better species for your forest plantings, better grasses and other plants for erosion control, improved cutting practices in producing forests, more durable soya-bean glued plywood, and even the production of vigorously-growing spineless varieties of Acacia are possibilities through research. In connection with the organization of research,

it is my firm conviction after spending two years studying research in the United States, that greatest progress can be made if the national, federal, or central government acts as a catalyst or "research stimulator" rather than as a "research doing agency". You now have many nuclei or small research efforts scattered through your provinces and colleges. With some financial assistance, encouragement, stimulation, advice and occasional direction, and leadership, these nuclei could be developed into strong cells.This would give you the needed research at far lower cost than if the central government was to assume the full responsibility. Central leadership and stimulation are very important in such a program, but the actual "doing of research", like your planting and soil erosion control work, should be accomplished locally, where you have the materials, land, conditions, and nuclei of well-trained and well-qualified research personnel.

7. As previously mentioned, I was amazed and concerned with the abundance of your forestry training centers. I do not believe that you can or should afford them. The forests of Korea are so important to your total economy that you need and should have one very strong, well-financed, well-equipped, and excellently staffed school. This school should provide strong undergraduate training for foresters in all fields: forest production, forest erosion control, and forest utilization or forest products. It should be so equipped and staffed as to provide graduate training for badly-needed research personnel, without which your total research program, regardless of its organization, will certainly be less productive. This school must have a staff of good teachers with broad experience. In addition, those engaged in

graduate training for research personnel must be doing research, must be interested in research, and must be well-qualified. I have not been in Korea long enough to evaluate your needs for forestry training of other types - for rangers, soil erosion control workers, etc. It may well be that a number of your present provincial forestry schools could serve very effectively in providing such training, rather than attempting to train four-year graduates.

8. My last point has to do with the need for an over-all forestry society or association. I do not believe that you have in Korea a single over-all forestry association or society similar to the Society of American Foresters in the United States. Foresters need such a group in order to provide exchange of information between administrators, research workers, and educators. It would provide a place for central government, provincial, and gun foresters to exchange ideas. Such a group helps promote understanding between foresters generally. Within such a group you could set up special small committees that would advise on such subjects as your research needs and its organization, your forestry school needs and organization, your extension forestry needs, and many other important subjects.

In closing, let me say again how much I appreciated your kind invitation to address you today. I hesitated before accepting because I do not claim to be an expert on any phase of Korean forestry after but three months with you. I hope that you will take the suggestions in the same spirit in which they are given. They constitute my frank and honest appraisal or your progress and problems. Korean foresters have a tremendous job ahead. Your success will determine to a major extent

the progress of your nation. I will always remember your kindness, your hospitality, your understanding, and your friendship. It has been a genuine privilege and pleasure to be with you for this too-short period. I wish you every possible success in the large and important task lying before you. Our fire prevention slogan in my native state is "Keep Minnesota Green". Your slogan might well be"Make Korea Green".