The William L. Hutcheson Memorial Forest Bulletin

Dedication Issue

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PREFACE

This volume is a collection of the addresses and papers presented on the occasion of the dedication of the William L. Hutcheson Memorial Forest. They are being published in this form both to make them available to a larger audience than was able to attend the dedication exercises and to have a record of what was said reproduced in a form more adequate for preservation.

The dedication program for the William L. Hutcheson Memorial Forest took place on October 15, 1955. The dedication ceremonies were held in the morning at East Millstone, New Jersey, and a scientific session was held at New Brunswick, New Jersey, in the afternoon.

The site chosen for the dedication ceremonies in the morning was in the large field near the central part of the tract against the northern edge of the forest. In spite of heavy rain the night before and showers during the course of the ceremonies, a large group of people was in attendance. Dr. Lewis Webster Jones, President of Rutgers • The State University, presided.

The scientific session was held in the Rutgers Gymnasium in the afternoon. Dr. Marion A. Johnson, Dean of the University’s Graduate School, presided at this meeting. Dr. Paul Sears, who was unable to be present, sent a paper on the importance of preserving natural areas. That paper is included in this publication.

Throughout the program the woods was referred to both as “Mettler’s Woods”, by which name it had been known in the past, and as “The William L. Hutcheson Memorial Forest”. During the ceremonies it was dedicated as “The William L. Hutcheson Memorial Forest” and it is by this name that it will be known in the future.

—Murray F. Buell
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THE ROLE OF THE CITIZENS' COMMITTEE

WILLIAM H. COLE, Chairman
The Citizens' Scientific and Historical Committee for the Preservation of Mettler's Woods

Nineteen months ago a self-constituted group of people, aroused over the probable destruction of Mettler's Woods, announced that they would try to raise funds to save the woods. For a year before that some of them had been privately trying to find a benefactor. And for more than a year before that it was known by a few persons that the woods would be cut down unless the State or the University could buy them.

For 20 years scientists and students had used the woods as an outdoor laboratory. Evidence had accumulated that the forest was a continuing thing, though it was changing in the relative proportion of species. As the old trees toppled during the storms younger ones took their places. Studies of a fallen tree 323 years old proved that fires occurred about every ten years up to the last one in 1711. These were undoubtedly set by the Indians to aid their hunting. The last fire was about the time the white man took charge of the area. From this it was concluded that naturally occurring fires are not a serious threat to the continuance of the woods, though they may influence its characteristics since various species have differential resistance to fire. Studies of the soil in the woods showed that it had never been plowed. Evidence in the forest indicated that it had never been cut and cleared. Only after the windstorm of November, 1950, when fallen trees and trees very badly damaged in the tops were salvaged, had there been any major disturbance in the woods within the memory of man. The evidence led to the conclusion that the forest, at least its easternmost third, was a continuation of a very ancient one going back to the last ice age. All of this knowledge added up to the conviction that the woods should be preserved as a remnant of the original hardwood forest that covered the eastern seaboard when the white man took possession. It was also clear that the woods would constitute an unprecedented natural area for exhaustive study over the years to document the large number of complicated methods and processes which Nature uses in developing and maintaining such a forest.

When it became clear that University and State funds would not be available, the Citizens' Committee for the Preservation of Mettler's Woods began its public appeal for contributions. The owner, Mr. Thomas Mettler, co-operated with the Committee in every possible way and quickly agreed to accept far less for the tract than had been offered by lumbermen and developers. The sum of $100,000 was set as a minimum amount to purchase the tract of 136 acres, to maintain it, and to carry on studies over the years. With no subsidy of any kind, appeals were made to public relations men, printers, writers, newspapers, magazines, clubs and societies for their respective help. Responses were generous and genuine.
Effective and continuing newspaper publicity was given by the New Brunswick Daily Home News, The New York Times, the New York Herald Tribune, the Newark News, the Newark Star Ledger, the Elizabeth Journal, and the Philadelphia Inquirer. Many other newspapers in New Jersey and elsewhere carried the story at least once. Special feature articles appeared in the following magazines: The Flower Grower, the Bulletin of the Garden Club of America, the Garden Journal of the New York Botanical Garden, the Audubon Magazine, and, finally the remarkably well told and beautifully illustrated story in Life Magazine.

Gifts came in daily, frequently accompanied by suggestions or offers of help. Within a few months it became clear that people throughout the country were deeply interested in having the woods saved. Organizations offered to assist—some local, others covering the whole State or more. Early among them were the New Jersey Audubon Society, the New Jersey Garden Club, the Nature Conservancy, about which you will hear more from Mrs. Hood. Others were the Adirondack Mountain Club, the Green Mountain Club, several different groups of Boy and Girl Scouts, the New Jersey State Federation of Shade Tree Commissions, New Jersey Parks and Recreation Association, the American Society of Foresters, local historical and nature clubs, chapters of the Daughters of the American Revolution, Children of the American Revolution, Colonial Dames of America, Daughters of Colonial Wars, United Daughters of the Confederacy, Middlesex County rod and gun clubs, some local service clubs, and scores of women’s clubs, veterans’ clubs, and schools. Also responding to the appeals were 1350 individuals whose gifts ranged from a half dollar to five hundred dollars, many of whom wrote, “Wish I could give more.” These persons represented seven different countries and 38 different states in the United States.

By early June, 1955, a bit more than half the goal had been raised or pledged, when the United Brotherhood of Carpenters and Joiners of America promised a most generous contribution provided arrangements could be made to transfer the tract to Rutgers. The State University to safeguard it in perpetuity and to carry on studies through the years ahead. Those provisions were all agreed to by the Trustees of the University, and today we are here to accept publicly that gift and all the other gifts which have made possible the saving of the woods. The funds raised were not only adequate to purchase the woods, but also to set up a reserve for future maintenance and study. To the Brotherhood and to all other contributors we are sincerely thankful.

At the end of this ceremony and dedication, the Citizens’ Committee for the Preservation of Mettler’s Woods will disband forever. Its work is completed. Rutgers—the State University will take over the trust for the benefit of mankind in perpetuity.

On behalf of you here this morning, and all others who have helped bring this event to pass, and on behalf of all those who will benefit from the woods in the future, I express thanks and appreciation to each member of the Committee for his unselfish service to the cause of conservation.
THE SUPPORT OF VOLUNTEER CONSERVATION GROUPS

ELIZABETH HODD

It is a pleasure and an honor for me to represent this morning the several volunteer groups which co-operated with the Citizens' Committee for the Preservation of Mettler's Woods. Naturally, I am most familiar with the role of the Garden Club of New Jersey and its member clubs throughout the State, but today I speak for all the volunteer organizations which gave help as well as for the garden clubs.

It is most encouraging to note that support came from many sources. Throughout our state and nation there are innumerable organizations dedicated in whole or in part to the preservation of natural areas and to their proper use. The underlying principle in all these is that the present generation has a duty to pass on to the next generation the priceless treasures it has received.

Since its organization in 1925, the Garden Club of New Jersey has sponsored many projects in the field of conservation. The Blue Star Memorial Highway, the Arboretum in Greenbrook Sanctuary, garden therapy in military and veterans hospitals, and scholarships to camps and conservation workshops are examples of state activity in the conservation of natural and human resources. Individually, garden clubs sponsor countless local conservation and civic projects. The support which our garden clubs gave to the preservation of Mettler's Woods is just another illustration of their basic philosophy.

Similarly, the New Jersey Audubon Society, as well as the National Audubon Society and other Audubon groups devote much of their resources to natural area preservation and conservation. The aims of the New Jersey Audubon Society are to fight unremittingly for the wise use of our natural resources, to campaign for intelligent and planned co-operation among conservation groups, and to provide information on animal life and its importance in conservation. Bird-watching in the early morning mists is one of the Society's great pleasures, but the birds themselves must be protected and places for them to live in safety must be reserved. This means that attention must be given also to water supply and food resources. To cite a recent example, the New Jersey Society played an important role in helping to save Island Beach. In other parts of the State are sanctuaries set aside by the help of Audubon groups where nature instead of man is left in charge. It is not surprising that members of the Society responded so generously to the appeal for the preservation of Mettler's Woods.

The youngest organization of the groups which assisted the Citizens' Committee was the Nature Conservancy, a non-profit corporation of national scope which received its charter in Washington, D. C., in October, 1951. Its unincorporated predecessor was the Ecologists' Union established
in 1946. That organization was the outgrowth of the Committee for the Preservation of Natural Conditions of the Ecological Society of America first appointed in 1917. In a historical sense, therefore, Nature Conservancy is well past its majority. The charter stated that particular objective of the corporation shall be “to preserve or aid in the preservation and proper use of our natural resources, to engage in or promote the study of plant and animal communities and of other phases of ecology and to promote education in the fields of nature preservation and conservation.”

The Nature Conservancy initiates projects and assists others. It serves as a clearing house for all those working to preserve areas. It seeks funds also from societies, foundations, and individuals for its own projects and for those which are approved by it. Under this policy, the Citizens’ Committee for the Preservation of Mettler’s Woods was given most important scientific and financial aid. Through it the second largest gift was obtained. Other projects recently assisted have been the saving of a large tract of the so-called eastern sequoia, or bald cypress, in the Corkscrew Swamp of Florida, the Mianus Gorge stand of ancient hemlocks and hardwoods which straddles the New York-Connecticut line, the Sunken Forest on Fire Island and Dome Island in Lake George, New York.

To each and all of these organizations, and to others which gave help, I extend sincere thanks for their essential support.

In the name of these organizations, I should like to pay tribute to Professors Cole, Buell, Johnson, and Small for their untiring efforts to “save Mettler’s Woods.” Their devotion to the cause was an inspiration, their success well deserved.

And I should like to congratulate the United Brotherhood of Carpenters and Joiners of America for its action in establishing such a splendid memorial to former President Hutcheson. If I may be permitted a seasonal metaphor, we deem it a privilege to have helped advance the line until this star quarterback could carry the ball across the goal.
THE LIFE AND WORK OF WILLIAM L. HUTCHESON

John R. Stevenson, Vice-President

United Brotherhood of Carpenters and Joiners
of America

In my lifetime I have drawn many assignments. Each of them I have tried to fulfill to the very best of my ability. Some were satisfying and others were chores. The task I have before me today transcends in personal pleasure and pride anything which has befallen me to date.

Man never stands quite so near to God as when he stands in the woods, for in the woods the handiwork of God is everywhere. It is in the surge and rejuvenation of spring. It is in the hum and the splendor of summer. It is in the mysterious and awesome transformation of autumn, which turns summer’s glory brown and sere, as a prelude to winter’s long sleep. Everywhere in the woods the drama of creation is being enacted over and over again—birth, life, death, and rejuvenation.

The drama being played out today is exactly as it was in the beginning of time. Here in this tiny patch of woods the ebb and flow of creation have gone on unmolested for eons beyond number. They were at work when Thrace and Macedonia were in their prime. On this spot Indian eyes may have watched them unfolding long before the white man dreamed of the new world.

And now we are here today to insure that they will continue as long as civilization endures. Here in this tiny island of unspoiled nature the cycle of existence will be repeated over and over again long after those of us within the sound of my voice are gone and forgotten. I cannot help but feel that we are here and now standing as close to immortality as it is possible for mortal man to stand.

Before I do anything else, I want to express my profound admiration for all the Mettler heirs who, through years of varying fortunes, resisted all economic pressures to sacrifice these woods for personal gain. There must have been many times when the temptation was real and pressing.

We also express our deep appreciation of the work performed by the Citizens’ Scientific and Historical Committee for the Preservation of Mettler’s Woods and to all groups and individuals participating in this worthy project, and to our colleague, Raleigh Rajoppo, for his splendid cooperation in bringing this undertaking to the attention of the General Executive Board of our United Brotherhood, which resulted in our being here today to participate in this program.

Individually and collectively, many sincere and dedicated people worked long and hard on this project. Out of busy lives they allocated time to campaign for the preservation of these few acres of unspoiled nature. To all of them we say, “Well done,” and “Thanks.”

Now it is the privilege of an organization whose historic roots are embedded deeply in the forest lands of America to place the capstone on this superstructure of common effort.
It is particularly fitting that these woods should be dedicated as a memorial to a man whose origins and accomplishments are linked closely with the wilderness areas of the nation. Throughout his lifetime he worked unceasingly for conservation and wise management of all our natural resources—particularly those of a renewable nature.

William L. Hutcheson was born in the deep woods of Michigan on February 7, 1874. He grew up in the woods. Before he could read or write he could translate innumerable signs that forests unfold to the practiced eye. To him a broken twig meant a bear had passed this way, or a muddy stream meant a deer had slaked its thirst here. In all the years of a rich and fruitful life, William L. Hutcheson never lost the deep love and respect for unspoiled nature he developed as a boy in Michigan.

As a boy Mr. Hutcheson began working in the woods. He started by cutting and framing timbers for ships. Therein he followed his father’s footsteps. He was apprenticed to the carpenter trade, became a journeyman, receiving 20 cents an hour and working ten hours a day, 60 hours a week.

In those days the lot of the worker was hard. The hours were long and the pay meager. There were no protections against the woes of illness, accidents, or unemployment. The evil slings of misfortune rained heavily on those who had to work with their hands for their daily bread.

Against these many injustices the soul of young William L. Hutcheson rebelled. In May, 1902, he helped organize a local union at Midland, Michigan, and was immediately elected its first president. Shortly thereafter he transferred to Local Union 334 at Saginaw. For the next half century he devoted all of his time and his talents to the upbuilding of the United Brotherhood of Carpenters and Joiners of America and the perpetuation of the American way of life.

Gradually he rose through the ranks of his organization until, in 1915, he assumed the presidency of the United Brotherhood of Carpenters and Joiners of America.

Under his inspired leadership the United Brotherhood grew and prospered. From a membership of 200,000 he built his organization to over 800,000 members in the 36 years he was at the helm. He stabilized its financial structure and spearheaded the move which culminated in the erection of the splendid Home for Aged Members at Lakeland, Florida, where carpenters 65 years of age and with 30 years' continuous membership can spend the remainder of their lives in comfort and security.

I do not believe it is any exaggeration to say that this Home for aged members, built and maintained by the United Brotherhood of Carpenters and Joiners of America, is one of the showplaces of Florida. Situated on the shores of beautiful Lake Gibson, a few miles out of Lakeland, it is approached by paved drives which meander through vistas of lawns, flowers, and venerable moss-draped live oaks. A thousand acres of prime citrus groves surround the Home. In addition to providing fresh citrus fruits for the tables of the Home, these groves go a long way toward making the Home self-supporting for they make the United Brotherhood of Carpenters and Joiners of America one of the largest single producers of citrus fruits in Florida. A large herd of blooded dairy cows insures a plentiful supply.
of milk and milk products for the occupants of this Home. The Home is an empire of its own. Every conceivable form of recreation, including an 18-hole golf course, is provided for the enjoyment of Home occupants without cost. A complete hospital is maintained to guard the health of retired members living there.

And the moving spirit behind all this was William L. Hutcheson. He spearheaded the drive which established the Home. He drove the first survey stake when the land was a wilderness. He supervised the actual planning and erection of the Home. In addition to being General President, he served as manager of the Home from its inception in 1928 until he passed away in 1953.

Thus we find that Mr. Hutcheson’s duties and talents were not confined to labor matters. As manager of the Home, he became an authority on the raising and marketing of citrus fruits. He successfully combined the occupations of luxury hotel manager, dairyman, truck farmer, and hospital supervisor. But the Home for aged members is only one of the monuments he left behind him. The United Brotherhood’s pension plan is largely his brainchild. He manned the laboring oar in the drive which established the Union’s pension plan. As of today, some 20,000 old-time members of the United Brotherhood of Carpenters and Joiners of America are receiving pensions from the union.

The Home and the pension plan have been in effect for over 30 years. They are truly dreams brought to reality by the initiative and inspiration provided by William L. Hutcheson. I need not dwell on what a boon they have been to thousands of old-time members.

In his lifetime, Mr. Hutcheson saw the organization he headed for so many years elevate wages from dollars per week to dollars per hour. He saw it cut hours from 60 and 70 per week to 40 and 37. He witnessed an improvement in the welfare of the families of carpenters who became better fed, wore better and more appropriate clothing in winter and summer. He saw their children grow up and go to college and become leaders in the sciences, arts, and professions. He had the satisfaction of knowing that all these things were made possible by the efforts of the organization he headed.

The contributions Mr. Hutcheson made to human welfare were not confined to the United Brotherhood of Carpenters. For years he served as a vice-president of the American Federation of Labor. On many occasions he attended conferences in Canada, Europe, and South America. Over the years his friends and admirers throughout the world became legion. When death ended his long and fruitful career, there was mourning in teeming cities and tiny hamlets in many climates and lands.

In a message of condolence at the passing of this distinguished citizen, President Eisenhower concluded his telegram with the sentence, “He was a true American.” No words could more aptly sum up the life of William L. Hutcheson. He was indeed a true American.

Year in and year out, for over a half century, Mr. Hutcheson waged unrelenting war against the radicals and communists who tried to use the very freedoms guaranteed by the Constitution to destroy both the Constitu-
tion itself and the government maintained under it. As early as 1926 he and the members of his General Executive Board issued a circular letter warning all members that communism and true trade unionism had nothing in common and that no man could practice both at the same time.

In all the years since then there has never been a known member of the Communist Party in the United Brotherhood of Carpenters and Joiners of America. William L. Hutcheson was fighting communism skillfully and doggedly when it was only another word in the dictionary to many Americans. I shudder to think what the situation might be today if Mr. Hutcheson and fearless men like him in the American labor movement had not stood up to the communist threat years ago.

For their efforts William L. Hutcheson and his colleagues in American labor were vilified and slandered by the communists and their fellow travelers. Particularly was this true of Mr. Hutcheson. Because he fought them so effectively they heaped ridicule and abuse on his head. All the techniques of character assassination and smear which they used so skillfully were brought to bear against him. But not once did he ever take a step backward in his personal fight to keep America free and strong. No more unyielding foe lived in our time.

The kind of America William L. Hutcheson visualized and fought for was a free America—free both from communism and from strongly centralized government. He looked askance at the gradual encroachment of governmental agencies in labor relations and many other fields. In his career as General President of the United Brotherhood of Carpenters and Joiners of America, he stood up to many attempts to make American labor subservient to an arm of government. Often he did so at considerable personal peril.

In the 1920’s he refused to knuckle under to the so-called American Plan, which sought to reduce unions to glorified debating societies. Against all sorts of pressure he refused to compromise sound union principles. In the end, the American Plan was discarded and organized labor remained a free and independent force dedicated to the common good.

Twenty years later, with his own personal liberty at stake, he defied the effort of the Attorney General’s office to impose dictation on labor unions. He fought the matter through one court after another, clear up to the Supreme Court. There he achieved victory for himself and for organized labor. While less courageous labor leaders were pleading nolo contendere he was fighting for the right of unions to remain free and untrammeled by direction from Washington. Legal labor history was thereby made.

However, the services of William L. Hutcheson were not confined to labor matters alone. Three Presidents of the United States drafted him for public service. In all three instances he acquitted himself with distinction and honor.

During World War I, President Woodrow Wilson named him to serve on the War Labor Board. Under the joint chairmanship of former President William Howard Taft and the Honorable Frank Walsh, the War Labor Board rendered outstanding service to the nation during the trying
days of World War I. As a member of the Board, Mr. Hutcheson deserves a full measure of credit for his wisdom and experience which helped to guide the Board over many rough hurdles.

In 1935 President Roosevelt appointed Mr. Hutcheson a labor adviser to the Santiago, Chile, meeting of the ILO, the agency created by the League of Nations to work for the betterment of living standards throughout the world. Among the hundreds of delegates there representing government, industry, and labor, Mr. Hutcheson was one of the most eloquent spokesmen for a free enterprise system to increase production and a free labor movement to insure a fair distribution of that production.

President Truman too saw fit to call on the services of William L. Hutcheson. For two years Mr. Hutcheson served with distinction on the Labor Management Panel set up by President Truman to advise him on labor matters.

An ardent Republican all his adult life, Mr. Hutcheson gave much of his time and talents to the party. In the Hoover and Landon campaigns he served as director of the Labor Division of the Republican Party. In the 1951 convention of the Republican Party he was a delegate from Indiana. He was one of the two delegates from Indiana who voted for Dwight D. Eisenhower from the first ballot until his nomination was achieved.

In the brief time allotted to me it is impossible to touch on the breadth and scope of Mr. Hutcheson’s activities and interests. He was first and last a great labor leader. But he was also a businessman, an administrator, and a patriot.

It was only natural then that the twenty-seventh General Convention of the United Brotherhood of Carpenters and Joiners of America, held in Cincinnati last November, should authorize the establishment of a suitable memorial to this able leader whose contributions encompass much of the world.

In searching for an appropriate memorial, the General Executive Board considered and discarded many ideas. Nothing seemed suitable. But when the plight of this tiny island of primitive America was called to the attention of the Board, there was unanimous agreement that this was a fitting memorial. No man loved the woods more. No man did more for the people who earn their living through the harvest of the woods.

In a real sense, William L. Hutcheson was a product of the woods. Like a forest giant he weathered the winds and gales without flinching or yielding. Until my dying day I will never think of William L. Hutcheson without recalling a poem whose authorship I have never been able to establish. It is called “Good Timber” and reads as follows:

The tree that never had to fight
For sun and sky, and air and light,
That stood out in the open plain
And always got its share of rain
Never became a forest king,
But lived and died a scrubby thing.
The man who never had to toil,
Who never had to win his share
Of sun and sky, and light and air
Never became a manly man,
But lived and died as he began.

Good timber does not grow in ease.
The stronger the wind, the tougher the trees;
The farther the sky, the greater the length;
The more the storm, the more the strength;
By sun and cold, by rain and snows,
In tree or man, good timber grows.

Where thickest stands the forest growth
We find the patriarchs of both,
And they hold converse with the stars
Whose broken branches show the scars
Of many winds and much of strife.
This is the common law of life.

To the many students wherever they may be who have studied nature's wonders in the woods, to the many who will receive instruction here in the years that will follow, to the teaching staff and officials of Rutgers University, and to all of you present here today the United Brotherhood of Carpenters and Joiners of America says, “We wish you well.” May Divine Providence take care of you.
PRESENTATION OF THE DEED AND TRUST

MAURICE A. HUTCHESON, President
United Brotherhood of Carpenters and Joiners of America

I believe an occasion of this kind portrays the American way of life at its very best. We are gathered here today to insure the future of a small sample of America as it might have existed at the time the Pilgrim Fathers landed.

We are not here as Republicans or Democrats, Christians or Jews, wealthy or poor; we are here as American citizens interested in seeing that our children and our children's children have an opportunity to see and know what America was like in the beginning.

When it became known that these few acres of virgin America might fall victim to the woodman's ax, thousands upon thousands of people in all walks of life rolled up their sleeves to prevent such a tragedy. They gave generously of their time and money. They worked long and hard, with no hope of personal reward or glory. In doing so they demonstrated one of the qualities which I believe makes America great—the capacity for forgetting differences and working together harmoniously for a common cause.

I doubt if anywhere else in the world this occasion could be duplicated.

What makes me particularly happy is the fact that the organization which I have the honor of heading, the United Brotherhood of Carpenters and Joiners of America, has been given the opportunity to contribute to this very worthy project.

Next to farming, carpentry is the oldest vocation in the world. Somewhere back in the dim ages before history was written some ancient man must have hollowed out a rotten log and thus became the very first carpenter. In the thousands of generations since that time carpentry has developed into a complex skill. But the close tie between carpentry and the woods has changed very little.

As a whole, carpenters have, I believe, a greater interest in our forests and woods than any other branch of society. Materials come and go, but to the carpenter, wood is king of them all. The kinship between carpenter and wood is as old as mankind.

Therefore, whatever happens in the woodlands of America is close to his heart. The diseases and insects which threaten the forests are his enemies. The harvesting methods which ruin reseeding arouse his anger. The scientific advancements which promise better forests for tomorrow get his whole-hearted support. And most of all, he believes that no man can visit the woods without refreshing his spirit and rebuilding his hope.

It is only natural that the United Brotherhood of Carpenters and Joiners of America should have a deep interest in the saving of these woods for study purposes. What scientists learn here may affect our future for generations to come.
For all these reasons it gives me great pleasure to present trusteeship in this small island of original America to Rutgers - The State University as a gift from the United Brotherhood of Carpenters and Joiners of America in the name of one of its outstanding departed leaders, William I Hutcheson.

I know that the University will use this heritage wisely and well. I know that under the direction of the University, it will be used to expand the horizon of man's knowledge. I am sure it can be enlisted to turn men's minds away from material things and back to things of mind and spirit.

It is entirely fitting that the United Brotherhood of Carpenters and Joiners of America should make this contribution to man's advancement. For three-quarters of a century the United Brotherhood has devoted all its efforts toward making life richer, happier, and fuller for its 800,000 members. On behalf of each of them I make this presentation.

_Dedication of the Hutcheson Memorial Forest, October 15, 1955_
DEDICATION OF THE
WILLIAM L. HUTCHESON MEMORIAL FOREST

LEWIS WEBSTER JONES, President
Rutgers • The State University

In the name of the Trustees of Rutgers • The State University, I accept this gift and this trust. Rutgers solemnly and gratefully undertakes the task of preserving these woods as a natural forest, as a place of wonder and beauty, as a priceless laboratory in which future generations of students and citizens may increase their knowledge of nature and nature’s laws, and grow in the wisdom modern man so sorely needs to live and work within them. We pledge ourselves to this trust in perpetuity. We are celebrating today the birth of a project which will, God willing, endure for centuries.

It is peculiarly fitting that Rutgers should undertake such a trust. Like the woods themselves, it has been part of the State of New Jersey since Colonial times. When Rutgers was founded, much of the State was covered by the same kind of forest. Conservation has always been of active concern to members of the University faculty, who have promoted the proper use and preservation of natural resources. And as the State University, Rutgers is pledged to devote its own resources of teaching and research to the welfare—intellectual, spiritual, economic, and recreational—of the people it serves.

Indeed, a university is the most appropriate agency—perhaps the only one—which can be trusted to undertake the long-range preservation and responsible use of such a priceless and irreplaceable part of our inherited natural treasure. Founded in the early middle ages, the universities have endured for centuries and will continue to endure for many more, as independent, incorruptible agencies of civilization, of which they are the most characteristic expression.

Universities are strongly conservative. They are the guardians and custodians of a great intellectual and cultural tradition, and as such resistant to passing political windstorms. The maintenance of museums, repositories of the physical remnants of vanished cultures, or instructive collections of rocks, plants and artifacts from all times and places, has long been recognized as a proper university function. If you like, you can look upon this woodland as a living museum.

But universities are also strongly progressive. They are our principal agency for orderly change. They are concerned always with the future, and dedicated to the effort to use intelligence constructively, making the future better than the past. Our modern civilization is uniquely dependent on science and technology, and it is from the universities that most of the new knowledge, and the trained personnel to discover as well as to apply it, must come. If you are so minded, you can regard these woods as another, and most valuable kind of scientific laboratory.

Whether we think of it as a museum, or a laboratory, or as something to be valued simply for its own sake, the project we undertake today is ideally suited to the role of a university. It links the past and the future in a continuum of civilized purpose.
Whenever we set out to preserve something of value, whether it be knowledge, tradition, or a painting, the process is essentially the same. The conservative and the progressive are complementary functions. Conservation is not hoarding; it is wise use. An empty house eventually decays and falls down. Tradition dies unless it is re-born in the hearts, minds, and habits of each new generation. Knowledge cannot be inert; it must be active, constantly renewed and enriched, constantly related to new needs and new experiences. Learning cannot be fully alive unless it is growing.

It is something of a miracle, for which all of us are profoundly thankful, that in this highly industrialized state a piece of unspoiled forest can still be found. It has survived the encroachments of men, farms, roads, factories and towns, to remind us of the American land as it was before the white man came. The love of our land is still strong, even among urban cliff dwellers, amounting at times to an acute nostalgia. But it is a deep and sound feeling, and its strength is shown in the response of so many people to the appeal for help, and in the sympathetic comment and widespread interest which this project has aroused.

The members of the University are grateful to every person and every organization whose gifts have made it possible to preserve the woods, and we are honored by the trust you have given us.

It is particularly gratifying, and particularly significant, that a trade union should endow a memorial of this kind to a former leader. Apart from the delightfully appropriate thought that it is the carpenters who have "spared the trees," this action by the United Brotherhood of Carpenters and Joiners of America is another indication that the great trade union movement has fully come of age, taking its proper share in the responsibility for our civilization by preserving natural resources, and endeavoring in basic research. Basic research is absolutely essential to the continuance of our way of life; but because it is directly profitable to no one, it is not easy to get support for it. I congratulate the Brotherhood of Carpenters and Joiners on their far-sighted, disinterested gift. I was struck also by the similarly public-spirited gift, in this case a memorial to William Green, which the A.F. of L. has recently made to Ohio State University. One of its provisions was to offer scholarships to students in the liberal arts—another thing which is as essential to the continued health of our way of life as the research is lacking in immediate profit to the donors of the scholarships.

The trade unions, like the universities, have both a conservative and a progressive role. Perhaps that is true of all healthy organisms, and all good human organizations. Trade unions are a natural social growth, an ecological adaptation, if you like, to the conditions of industrial society. They came into being as a part of the struggle for existence in the new and harsh environment of factories and towns and the impersonal labor market. They have, in a sense, built up a stronger social inheritance for what the group historians have called "the disinherit laborers," winning for labor an increasingly important role in our national life. The unions have grown and flourished because they perform an essential human function. Like the trees in this forest, they are now full-grown. They are thoroughly estab
lished members of our co-operative, competitive, interacting social community, responsibly concerned both with its preservation and its continuing advancement.

This woodland will be guarded and preserved, and builders, lumbermen, setters, hunters, and other destructive human influences, will be kept out. But it will also be fully used, in ways which will not destroy or disturb the natural balance of the myriad inter-related living things which make it up.

Here is a natural laboratory for the education of students in the biological sciences, and the training of needed personnel. In it, long-range studies can be embarked upon, in the certainty that they can be carried through to distant conclusions. To those of us who are oppressed by the hectic tempo of modern life, there is something inspiring and reassuring in the idea of a century-long project. We can expect that, out of these woods, many useful and practical additions to our knowledge will come and perhaps some important theoretical discoveries.

But I hope also that the continuing, close study of ecology will do more than increase our practical and theoretical knowledge. I hope it will do something to give us more wisdom. We may perhaps begin to learn a natural piety, based on a deeper insight into man's position as part of the community of nature, not a separate being whose only responsibility is to exploit nature for his own often short-sighted ends.

I know that many of you who have given to the Fund for the Preservation of Mettler's Woods have not done so because you wanted merely to promote the biological sciences or increase the economic efficiency of forestry. Some of you may even be unmoved by the thought of the expected output of Ph.D. theses. You have given, I think, out of love for the woods.

But love is by no means irrelevant to research and education. Aldo Leopold, after a lifetime devoted to conservatism, asked himself why we were still losing ground, in spite of all educational efforts, in the struggle to preserve our natural resources. He concluded that something was lacking in our approach to the problem, and that "something" was love: a feeling for, as well as an understanding of, the natural community of which we are a part.

But love and knowledge are not enemies. As we look forward to the preservation and use of these woods, we may echo the prayer of St. Paul, "That your love may abound yet more and more in knowledge and judgment."
THE MATURE OAK FOREST OF METTLER'S WOODS

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Vegetation is constantly changing. Some of the major and most dramatic changes are those that accompany pronounced climatic fluctuation. Man’s influence on vegetation can likewise be great. Thus, the past history of Mettlер’s Woods, now dedicated as the William L. Hutcheson Memorial Forest, has reflected both climatic and human influences, and its present composition and structure are a result of them. The plan for the future is that human interference will be at a minimum, allowing the physical environment full play on the further development of the vegetation.

In the not far distant past, vegetationally speaking, an altogether different type of vegetation must have occupied the area on which the Hutcheson Forest now stands. We are only a few miles south of the terminal moraine formed by the continental glacier in late Pleistocene. The ice reached as far south as Metuchen during the Tazewell stage of Wisconsin time (MacClintock 1954). On the basis of determinations of the age of the Tazewell glacial drift in the midwest this was in the neighborhood of 20,000 years ago (Flint and Rubin 1955). The great mass of ice close to our area must have had a pronounced effect on the climate here. It is entirely possible that treeless arctic tundra occupied the area at that time. Wolfe (1953) has found evidence that the ground may have been perennially frozen. He describes soil structures of a sort that are being formed today in the treeless areas of Alaska. Direct evidence of such an arctic tundra in the form of fossil plant remains has not yet been found. However, there is direct evidence that the first forests to invade the land around Plainfield after it was left clear by the melting ice was a forest of pine, spruce, and fir. Seeds of these trees must have come from our area since, in the northward migration of forests, this area must have become forested first. Spruce and fir even occurred in the forests of the coastal plain section of the State (Potger 1945). The details of vegetation since that time are not certain, but undoubtedly climate fluctuations known to have taken place since the ice melted must have had their influence here, as we know they did in the northwestern section of New Jersey (Niering 1953).

Some time after the continental glacier had receded and probably after the boreal forests had migrated northward, giving way to broadleaf forests, the Indians came into the picture. There is some information in the literature concerning the influence of the Indians on forest vegetation (Day 1953). Of particular importance was their practice of allowing fires to burn through the forests. Such reports from historical records are substantiated by study of the forest. Careful examination of a cross-section of the base of a large tree lost in a severe storm in 1950 showed fire scars occurring at roughly ten-year intervals up to 1711 (Buell, Buell and Small 1954). The tree started to grow in 1627. The land was settled by white men in 1701. No fire of sufficient intensity to leave a scar occurred after 1711. It would be unwise to place too much weight on evidence from one tree, but its agreement with the historical record is significant.
Such long-continued subjection of an area to repeated burning inevitably must result in the exclusion of less fire-resistant species and the dominance of those not so readily destroyed by fire. Thus the Hutcheson Forest, like forests in some other parts of the country, may be oak-dominated because of a past history involving fire (Cottam 1949, Eggle 1938).

The period of white man's occupation has, in the life of the forest, been brief. There are a few bits of information from written records, from word of mouth, and from the study of the woods itself that give some idea of its history since 1701. We know that this land was settled by members of a Dutch company and has since been owned by members of the company or their direct descendants. Action during the Revolutionary War took place on the property, presumably in the immediate vicinity of the woods, if not in it (McCormick 1953). This could have had a temporary influence on the woods.

That the woods in general has been subjected to a minimum of human disturbance is confirmed by a statement made by the recent owner, Mr. Thomas Mettler. According to him, it has been a tradition in his family that much of the woods, particularly the eastern part, has never been cut and cleared, although fallen trees have often been salvaged for firewood. Furthermore, the tree whose basal cross-section was used in the study of fire history already mentioned started to grow in 1627 and was a tall forest grown tree with a clear trunk branching at a considerable height from the ground. There is one tree still larger standing and numerous others approaching its size. The particular section of the woods where these trees are has certainly been forested since the Indians lived in this area.

The storm of November 25, 1950, probably had a greater effect on the woods than any previous storm in history and perhaps more than any other single event in the history of the forest. Catastrophe resulting from natural phenomena plays a normal role in the dynamics of a forest, and that storm was indeed a catastrophe. It caused not only considerable breakage in the tree tops, but topped a good number of trees. The most unfortunate result of the storm stemmed from the great economic value of the damaged timber. Salvaging operations were carried out. It is fortunate that sections of the oldest part of the woods were left relatively untouched by that storm.

Both the storm and the concomitant salvage operations resulted locally in pronounced changes. The introduction of sunlight to formerly densely shaded spots stimulated the growth of many plants which had not grown there before. Many plants that had merely existed in the woods now grew, flowered, and produced fruit luxuriantly; and, perhaps most significantly, oak seedlings, which had been suppressed, responded to the introduction of light and grew rapidly.

The woods as it stands today may be viewed in two ways: first, its variable pattern over the area that it occupies; and second, its vertical structure as a forest community. In its present areal pattern the woods covers about 65 acres of land. Surrounding much of it there is a buffer zone of fields totaling in area about 71 acres. Although it is predominantly an oak woods throughout, there are some rather marked variations within it. Of greatest value as a natural area is the eastern end, in area roughly
one third of the woods. Being farthest from the homesites of the owner, it has, during the course of time, been less frequently subject to the salvaging of fallen logs for firewood as well as other casual disturbance.

Good drainage is characteristic of most of the area and is reflected in the type of vegetation. There are two major areas of poor drainage where the water table is very high during wet seasons. One of them is in the eastern section where a broad, low area along the brook supports, among other species, occasional pin oaks, swamp white oaks, and thickets of spice bush. The other area is at the western end where there is a young woods with considerable pin oak.

The predominant trees of the forest are oaks: white, black, and red. Red hickory occurs frequently, as do beech and white ash. Sugar maple is present, but, like several other species, it is represented by relatively few individuals. As it stands today, the woods throughout can be thought of as a mature oak forest.

Viewed from the adjacent field, two distinct layers or strata show up the high canopy of the tall trees and, beneath it, a continuous dogwood layer. The top of the forest reaches to over 90 feet, the dogwoods to about 35 to 40 feet. Within the forest one sees the clear oak stems disappear through the dogwood foliage, the first big branches spreading out about 50 feet above the ground. Shrubs form a layer from about four to eight feet high, the height varying with the species: the maple-leaved viburnum of the well-drained parts is a low shrub; the spice bush and arrow-wood are taller. An herb layer, generally lower than the shrubs, one to two feet high, is very striking in the spring and early summer when the May apple is present, but by late summer the May apple dies down and the remaining herbs are comparatively few and scattered.

A layer of mosses, reaching at most a few inches high, is the lowest layer of the forest. But this layer in the Hutcheson Forest is not conspicuous. Mosses are restricted to little clumps here and there, especially on exposed soil turned up by roots of fallen trees. Most of the ground is covered by the litter of leaves fallen from the trees and shrubs in past years.

Below ground there is likewise a certain amount of stratification of underground parts of the plants. They extend as far as the soil goes, in places 40 inches or more, to the shale rock below. Some tree roots even grow into the shale to a total depth of about six feet.

These are the interdependent layers which, together with their dependent animal populations, make up the complex community that is the mature oak forest of Mettler's Woods.

A few detailed studies have been made which were concerned, at least in part, with vegetation and environment of this community (Bard 1932, Schneider 1952, Buell, Buell and Small, 1954, Sparkes and Buell 1955, Anderson 1955). There is much more to be learned about this community as it stands now, to say nothing about its future development.

The immediate future, the next 50 to 100 years, can be reasonably predicted through careful study of the present forest, using techniques of the ecologist and the forester. The distant future, 5000 to 10,000 years, cannot be predicted, even if preservation continues, since vegetation is
so largely dependent upon climate; and, though we can expect climate to change profoundly as it has in the past, we cannot anticipate the direction of its change.

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SOIL RESEARCH IN NATURAL AREAS

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Most soil scientists spend most of their time trying to find out what kinds of soil we have, what plants are adapted to them, and what combinations of practices will give optimum sustained production. Generally we try to work out the most economically productive system that the kind of soil and the state of the agricultural arts will permit—the so-called "highest use." And, in the practical world, as distinguished perhaps from the purely aesthetic or scientific, this is soil conservation.

Yet soils are as interesting, as complicated, and as individual as other natural objects of scientific study, such as plants, birds, or stars. For a long time now soil scientists have been devoting a small part of their time to basic studies; although I think not nearly enough, even for the most effective practical results. Until we know the basic morphologic genesis, and behavior of a soil, we are greatly handicapped to discover its optimum use. We have available only the trial-and-error method with varying degrees of technical control. This method is both slow and costly. Most of the really great improvements have come from the application of new combinations of the principles developed from basic research.

We have known for a long time that each kind of soil is a dynamic living thing. At any moment it represents the combined effect of five main factors: (1) climate and (2) living matter, acting upon (3) the parent material, as conditioned by (4) relief, over periods of (5) time. With change in any part of the environment, these soil-forming forces combine to change the soil, to move it toward a new equilibrium point. But rarely can any soil be said to have reached an equilibrium. That is, the relationship between the soil and the factors of the environment is a functionally dynamic one, not a settled state of equilibrium.

Of these relationships the most important, most interesting, and most complicated is that between the soil and the living matter, not only the higher plants—the shrubs, grasses, and trees—but also the micro-flora and fauna. We cannot properly say that a soil causes a particular combination of living matter or that living matter produces the soil; they evolve together.

In agriculture and forestry we have long been aware of the need for selecting plants to fit the kind of soil that we have, or at least the modified soil that we can produce from the natural soil by economical treatment, such as liming, fertilization, water control, and the like.

We have given far less attention to the processes by which living matter reacts on the soil. We know from observation that quite different soils form under forest than under grass in otherwise similar environments. And we know that in different climates this contrast between grass and forest is unlike. That is, near the tension zone between forest and grasses in the temperate region we expect soils more fertile for crop
under the grass than under the forest. Yet in the humid tropics the reverse is true. Millions of native farmers in the tropics renew the fertility of their soils through the “bush” or forest fallow. Other great areas of soil in the tropics that were once forested have been invaded by savanna, anthropic savanna that has followed forest clearing and overcropping. Since the savanna burns each dry season, killing young tree seedlings, the forest never returns to restore the productivity of the soil.

One could give a great many other examples of relationships that have been learned mainly from orderly observations in the field through comparing one defined combination of soil and its environmental factors with another combination. This method, often called the method of geographic correlation, is perhaps the most important one in soil science; but success in its use depends upon accurately defined sample soil areas for comparison in which the mechanisms have been discovered through careful observation and experiment. And first of all we should begin with the natural soil in the natural landscape. It is as one of these local natural laboratories, supplemented by the full array of scientific apparatus, that I can see a great role in soil science for an area like Mettler’s Woods, now the William L. Hutcheson Memorial Forest.

THE WHOLE LANDSCAPE AS OBJECT OF STUDY

The useful studies that can be made at such a site cover a very wide range. Research to develop or to sharpen basic principles of soil genesis and behavior must deal with several factors at once. The whole system is living and dynamic. We find daily cycles of sunlight, temperature, humidity, and growth. We find rhythms of change from the start of one rain to the next. We have seasonal cycles, each only approximately like the one before and the one to follow. We have great swings of climatic change, and the “accidents” of hurricanes, floods, earthquakes, volcanic eruptions, diseases, and fires.

Then too, each organism is a part of the environment for other organisms, and is influenced by micro-climates and micro-accidents of great importance to it and consequently to other organisms and to the soil that directly or indirectly supports it.

I do not mean to imply that we can study each factor, each organism, and each part of the soil all at the same time. Much research needs to be very specialized and carried out not only at the site but also in the laboratory.

I do mean to emphasize the need for a broad point of view. One hears a lot these days about “over specialization.” Intense specialization is good and necessary, even, or rather especially, in the study of so complicated an assemblage as a natural landscape. What is evil is not specialization but narrowness of viewpoint—the study of a single organism or soil, or some part of an organism or of a soil, with little regard to the whole. Unfortunately too, a descriptive study of any part, or even of the whole, is valid only for that moment, like one single picture of a movie film. In fact, for many necessary studies we must “kill” the organism or destroy the soil. Then we have lost movement—the living part. But we must weigh and measure. Science is scientific only when it is quantitative.

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The soil scientist is thus caught in a dilemma similar to that of the physicist, who can measure either the position of an electron or its velocity but not both at the same time.

The broad point of view needed for successful soil research is not meant to imply emotionalism or even "natural history" by itself. Results must be quantitative. We need to answer the question of "how much?"

**SOIL-PLANT RELATIONSHIPS**

I should like to illustrate the kinds of relationships involved with examples.

**Nutrient cycle.** It is generally assumed that plants take three essential elements—carbon, hydrogen, and oxygen—from air and water; and that at least 13 other essential elements are taken mainly from the soil. These are phosphorus, potassium, nitrogen, calcium, magnesium, sulphur, iron, manganese, copper, boron, zinc, molybdenum, and vanadium. Perhaps chlorine is also essential. Besides these, several others are taken in that may have some unproved function in plants. At least cobalt and iodine are important to animals, and sodium and silicon can be used by plants as partial substitutes for other elements.

We also know that compounds containing these elements are synthesized into foods by the plants and returned again to the soil as excretions of the living cells and especially as dead tissue, leaves, twigs, and other parts. Thus we have a natural cycle of nutrients from the soil, to the plant, and back again to the soil.

Actually, however, the cycle is not so simple. Part of the nitrogen and sulphur comes into the soil as compounds released to the air by burning coal and other compounds. Such compounds of nitrogen and sulphur are absorbed by the rain falling through the air or directly from the air by moist soil. Some nitrogen is fixed during electrical storms and comes into the soil with the rain. Some nitrogen is fixed by micro-organisms into forms that can be used by plants.

Although these processes are fairly well known, estimates of the amounts involved under different conditions vary within exceedingly wide limits. The amounts gained and lost in many soils cannot yet be accounted for. This is especially true of the nitrogen available to plants in many soils of the tropics and subtropics. Suggestions of substantial additions of nutrients to both plants and soil through dusts and aeresols have scarcely been investigated at all. Nor have all the biological processes involving the nitrogen and sulphur of the soil been explored.

Then too, soils lose material through leaching, by removal from the surface with running water or wind, and by exchanges of air between the soil and the atmosphere.

The more nearly quantitatively we can measure these relationships among the nutrients the more nearly we may come to finding principles that will lead to improving the economy of nature. The plants, micro-organisms, and animals condition the relationships in many ways; and their activities are modified by the micro-climate at the surface and within the soil.
Physical relations. Living matter and climate modify not only the chemical nature of the soil but also its physical condition. As soils develop from their parent materials, the soil body, down to the limit of the biological influences, becomes differentiated into layers. If we dig a deep pit we cross these layers, or soil horizons. Collectively, these horizons make up the soil profile, which is unique for each soil type.

Roots sort over the material beneath and open up the soil, or fail to do so, depending upon the kind of plant, the character of the soil material, and the amounts of air and water relative to one another.

The surface layers usually receive continual additions of organic matter. Here changes in temperature and wetness are greatest. Organisms are most abundant.

The effects of these reactions under different sets of conditions are quite unlike. Generally in this part of the world, soils under forests gradually become acid. The decomposing organic matter produces reducing conditions. The tiny clay particles tend to become destroyed, and iron oxides and part of the colloidal organic matter accumulate in the subsoil, or B horizon. On acid sandy material this process goes rapidly. On limy, clayey material it proceeds slowly, often through a stage during which clay accumulates in the subsoil, as it does normally farther south and west of here.

As the soil-forming processes continue hardpans may form, even ones that inhibit the growth of roots. Some kinds form through the cementing of soil particles by the iron and organic matter. A common hard horizon in this section is called a fragipan because it is hard in place but is not cemented. It probably forms slowly as a result of wetting and drying plus downward movement of fine particles of silica. Dr. Carlisle has suggested that in the lower soil, above the continually moist zone, the soil dries in summer and cracks slightly. As the rains come on later, fine silica particles may be carried into the cracks before the whole layer is wetted. Then when it does wet, and the cracks close, the layer is compacted by the extra material in the cracks. Through the long-continued action of such a process, very dense soil horizons are formed through which water passes only very slowly and roots scarcely at all. This suggestion may or may not account entirely for the observed fragipans. But we do know that many kinds of soil of our northeastern states (as well as elsewhere) have these horizons. Some are weakly developed, while others are thick and hard; some are shallow and others deep. Under low levels of nutrient supply, their effects may pass unnoticed; but with normal liming and fertilization, shallow ones limit yields markedly.

We have already mentioned the great importance of roots to soil formation. The deep roots of trees swayed by the wind gently move the soil. This process maintains a blocky structure, even in heavy clays, through which water may pass. If the forest is removed from a soil requiring this process to maintain the structure of the subsoil and is replaced with shallow-rooted plants, the particles in the lower soil gradually flow together as the old roots rot away; the structure is lost; and the soil becomes less pervious to water and roots. In this way many soils that
are well drained under the natural forest become water logged after a few years of cultivation.

In this general region, the great hurricanes, although infrequent, have a great effect on soil formation. Recent research at the Harvard Forest suggests the impossibility of a truly climax forest in much of New England; the soils are so churned by overturning trees that few spots of soil would escape mixing for more than 300 to 400 years. Similar research needs repeating on other kinds of soil.

Perhaps these examples are sufficient to show the kind of relationships I have in mind. We could discuss the very important function of the micro-organisms and the factors that influence them—the food supply, temperature, light, and moisture.

The roots of rapidly growing trees in the humid tropics push much of the soil aside. With their death and rapid decay, the termites move it back. Thus in these natural soils we find rapid natural tillage.

We cannot complete the picture without knowing what happens to the water. Not simply as water in the well-known hydrologic cycle, but how it moves both dissolved and suspended organic and mineral matter.

EXAMPLES OF PRACTICAL IMPLICATIONS

As an agriculturist, I think of soil research as purposeful. But the directing of research toward immediate practical problems, at the expense of fundamental research for basic principles, can be wasteful. This has been our record in the United States. For a long time we have depended mainly on Europe for fundamental research and spent most of our own effort in applied research and testing. But for further advances we must carry on more fundamental research ourselves. I am confident that our total effort will then be much more effective in producing practical research results.

Our aim in agriculture and forestry is to develop new combinations of practices and treatments of soil, plants, and animals that are superior to those found in nature. Certainly we have done that; yet I feel that we have only begun to apply our great resources of power, engineering, and scientific skill to this objective. The chief limiting factor is our poor understanding of the basic scientific principles of soil behavior—principles from which new combinations may be invented.

Let me illustrate briefly with a few examples.

1. What do the various sources of plant nutrients contribute to plant growth and how are the amounts modified under different conditions? For example, we cannot yet account for all of the nitrogen that gets into plants; and we have little data on the contributions of fine dust from the air to supplies of phosphorus and other nutrients.

2. What are the effects of kind of soil, considering the total environment, on plant composition and how can the composition be changed and improved? Centuries ago Pliny observed that plant quality depends more on the kind of soil than on management. Why is it so hard to modify plant composition through soil treatment? Can we find ways to do it?
3. What are the effects of various kinds of plants or groups of plants on soil productivity for the same plants or other plants? Some plants can be and are grown continuously without loss of yield or soil productivity. Others do best when rotated with other plants, or when grown in mixed culture, even when fertilizers are used. The reasons for many such experiences are fairly well known while others are obscure.

4. How can we increase the efficiency of use of the water in soils, including the management of plant cover in catchment areas for optimum water yield?

These are examples of very broad problems about which we know something from experience—from comparing various combinations in different places and from empirical testing. We have made some important beginnings in basic research on a few segments of the problems, but generally the basic principles are still elusive.

Basic research in natural areas can play a very significant role in the development of such basic principles. True, we have in them a dynamic system; but the soils are relatively stable as compared with man-made combinations. We now have tools for the long-time dating of geological formations, soils, plants, and water, and for the continuous measurement of many of the dynamic factors that change from day to day and year to year.

It is along these lines that I can visualize significant contributions from Mettler's Woods to basic soil science.
PLANT ECOLOGY AND NATURAL AREAS

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It was seven years ago, almost to the day, that I was introduced to Mettler's Woods. After a tour of exploration with Dr. Buell, we sat on a log enjoying the woods in its fall coloration and inevitably talking of what it could mean if this virgin forest could be preserved.

For myself, I was only daydreaming with little thought of reality. I'd been through this kind of thinking several times before because of an interest in and an occasion to work with virgin forests in several parts of the United States. In at least three widely separated areas such forests which I studied were destroyed by lumbering a year or two later, usually because of a change of ownership. Much as the academic scientist would like to preserve examples of our original vegetation, his economic environment and resources hardly permit any effective competition when there is an industrial or economic factor involved on the other side. The more valuable the forest is for lumber and the easier it is to exploit, the more certain it is that the price will eventually be too high for an owner to resist. The same applies to grassland, especially if it is located in a highly developed agricultural area. Thus, in recent years, our few remaining examples of original vegetation which are near industrial and agricultural centers have disappeared at an accelerating rate. When they are once destroyed, they are permanently gone.

To be sure, federal and state agencies have taken over great acreages which include virgin vegetation, and these are available as recreational areas and for scientific study. But these agencies have slowed down on land acquisition and it is obvious that the administration and protection of small isolated tracts would not be attractive to them. Their support for preserving an area like Mettler's Woods is not common.

Again, universities are peculiarly unsympathetic to the acquisition of out-of-door laboratories. A number of institutions do have considerable acreages under their control and Duke University with 7,000 acres of forested land adjoining its campus is somewhat unusual in this respect. But almost invariably these acreages are the result of fortuitous circumstances rather than of a deliberate plan. In recent years we at Duke have been unable to sell the administration on purchases of other acreages, regardless of their biological importance. I know of similar instances elsewhere and I suspect that such opposition would be found rather generally.

These were the thoughts which accompanied my daydreaming that pleasant October afternoon seven years ago. But, because several people decided this need not be a dream and were willing to give countless hours to selling the idea to others, Mettler's Woods has been saved and we are here to celebrate that fact.

Many of you have undoubtedly contributed to the funds which made the purchase possible and, better still, gave support for the immediate
initiation and continuation of ecological investigation. Already graduate students have come here with the express purpose of initiating studies of the woods. It is not necessary, therefore, to sell the idea of preserving the woods. Its very uniqueness is almost sufficient to justify its preservation as a kind of living museum. This probably influenced donors who may have had but a vague idea of the kinds of studies which might be carried on here.

It is not my intention to spell out the kinds of work which will be done here. Rather, I would like to present some ideas which might help to explain the interest of plant ecologists in any natural area.

Before doing this it seems worthwhile to emphasize certain advantages peculiar to Mettler's Woods. Many protected natural areas are actually used relatively little for scientific research for the simple reason that they are remote from research centers. Thus the investigator must raise funds for transportation and subsistence under any circumstances. Sometimes the remoteness is such that there are no living accommodations, and there may be such a degree of inaccessibility that work is practical only in the summer months.

Intensive ecological studies require more than periodic observation restricted to summer, and so Mettler's Woods is ideal for such work, being easily accessible, near to a research center, and available for study in all seasons with continuity of observation assured from year to year.

Now, why is the ecologist interested in natural areas; what uses can he make of them? You all are aware that ecology is concerned with organisms in relation to environment. This means, of course, that the ecologist must know the organisms—not just what they are, but how and when they reproduce, the conditions under which they survive, their tolerance of each other and competitive abilities, and all the many factors of the environment which affect them. This provides an almost unlimited number of possibilities in the way of ecological research because we would like to know about all the operating factors in the environment, all the requirements of all the organisms, and finally how the organisms and the environment are inter-related.

But this is not very helpful in clarifying the ecologist's objectives. I am, therefore, going to draw a parallel which may be useful to anyone who is interested. A large segment of plant ecology has come to be known as "plant sociology" and, in fact, by some the expressions are used synonymously. At first glance, this may seem curious in view of our usual conception of sociology. But it is no more so than the recent trend toward labelling certain types of studies of man as "human ecology."

A dictionary definition of sociology says, "it deals with the origin and evolution of society, or of the forms, institutions, and functions of human groups." This applies equally well to the phases of plant ecology which are concerned with natural vegetation and the groupings of species into plant communities. I can think of no better illustration than the analogy used by Dr. W. S. Cooper, a former professor of mine, and I shall therefore use the idea here, although the details may not be as he expressed them.
The settlement and colonization of our country only a few years ago was characterized by a pattern of events, repeated again and again. Each area was visited first by explorers in search of something new and different; willing and able to live off the land and undergo any hardships to satisfy their curiosity. Their reports on their routes of travel, of the game and climate, brought trappers and hunters. They too were self-sufficient and happy in their isolation, but their objectives were different and they stayed so long as there was game for food and the pelts which they sought. Now, as a natural result, trading posts were established and these, in turn, became centers to which less nomadic pioneers headed when in search of new land for cultivation. They brought families and some agricultural equipment and settled in the vicinity in the hope of greater fortune and with the intention of permanent residence.

By now the explorers had long since moved on, and the trappers and hunters soon moved too since they considered the country crowded when they found a homestead in a favorite valley and land being cleared or broken wherever they turned. This was the vanguard of civilization to them and they would have none of it.

Meantime, where several permanent homes were established there were always some settlers with special skills who were sought out for help with particular jobs. Independent and self-sufficient as the early settlers might be, an interdependence soon developed as special skills were exchanged. There were those, for example, who were proficient in repairing wooden wheels and setting their iron rims; others had a gift for diagnosing and handling sick animals; and still others became experts at midwifery. Thus, a dependence upon one another was a natural development and as the communities grew these gifted folk automatically became specialists when they eventually had time for nothing else. Of course, over all there was a co-operative assistance in times of emergency, such as Indian uprisings or epidemics, which represented the beginnings of community structure.

At the same time there was further introduction of specialists which further divided responsibilities and resulted in greater interdependence. Banks became necessary as barter became too complicated; churches and schools grew up in every center of population and this necessitated clergy and teachers; bars required bartenders; law enforcement became a community rather than a personal concern and was turned over to a sheriff. Thus there came a division of responsibilities and an interdependence which became more complicated and less avoidable as the communities grew.

To be sure, not everyone made constructive contributions in the system. There were dependents of various kinds as there are today among the human population, and there were parasites—like gamblers, e.g. Then too, there were other lesser organisms in these categories—disease organisms, rodents in fields and homes, and undoubtedly termites in wooden foundations. Leavening the entire system was the competitive drive of the individual who sometimes sought to accumulate material things—a washboard for his wife, glass in the window of his cabin, or horses instead of
oxen for himself; sometimes the ambition was for education, a white-collar job, or even a political appointment. As the communities became more complex certain individuals became the dominants in various fields, controlling or influencing the thinking and procedures of many others, less aggressive or less qualified. At the same time man progressively moved toward management or control of portions of this environment. He could move from a stream or spring if he dug a well, go still further when he acquired a pump. This, of course, has gone on right up to the present with irrigation, solar heating, and air conditioning to illustrate the point.

The various communities that grew up expanded for various reasons and at different rates. The sociologist and the economist could elaborate on this at length. Some communities stagnated and disappeared, others became our large cities of today, and some, changing slowly, have enlarged but little. Always change was characteristic, sometimes rapid and dramatic, and sometimes there were periods of depression when change was hardly noticeable; sometimes catastrophe struck and floods, epidemics, or economic circumstances altered the course of events in marked fashion. Today we are all aware that we are in a stage of extreme modification of the structure of our human communities as a result of an expanding population and economy.

Through prehistoric and historic times we have evidence that communities and civilizations have gone through such developmental processes and that some mature communities have disappeared as climates changed; others have stabilized at a high level of integrated dependency; others have become over-populated and given rise to major migrations.

All these characteristics of human communities are closely paralleled in natural communities. The chief difference is that plant communities and their sociology are controlled by natural laws and the organisms cannot make adjustments as can man to compensate for, to ameliorate, or to use the natural phenomena around him. Thus, in a given set of conditions, natural communities, if unhampered by man, undergo a pattern of development that repeats itself with minor variations. If that pattern can be deciphered in terms of particular or general environments, the development and eventual structure of other communities can be accurately predicted. Furthermore, the responses of natural vegetation in various habitats may be highly indicative of the potential of those habitats for men's use.

Briefly, to illustrate, any bare area, large or small, is a frontier or a new land to plants. Sometimes the environment is so extreme that no more than the accidental wanderer gets into it and then it may not survive. More often a bare expanse will be colonized first by hardy pioneers—often annual weeds that have found their way to all parts of the world. Then come the more permanent settlers—biennials and perennials—aggressive and highly competitive. When they take over, the earlier pioneer annuals disappear, but the forerunners of a more complex community soon come in. Where the climate will support forest these are shrubs and tree seedlings (equivalent to bankers and shopkeepers). Already, competition is playing a part in the selection of species which will be successful here and
the probable nature of the ultimate community on this site may be indicated. Certain species may have the ability to meet the competition of all others and they will become the dominants, others unqualified to live in a many-layered forest (skyscraper existence) soon disappear. Still others survive in or may actually move into the developing community as parasites or dependents. Should the tree seedlings become well established they might grow up into dominants at maturity and control the situation for a considerable period of time. But in many forested areas, as in developing cities, there is still big business with mergers and stock splits to be reckoned with. This first forest, of relatively simple structure (shopkeepers) is usually replaced by a much more elaborate combination of species whose inter-relationships are as delicately balanced as those of interlocking holding companies, union and management, or even political parties.

Now the plant community is as complex as any highly organized urban center and the whole has reached a stage of dynamic equilibrium whose general characteristics are determined by the over-all climate and whose specific nature may vary with the particular habitat. Individuals may disappear but the organization remains much the same, as replacements of the same kind take over where old hands leave off.

In plant sociology such a community is termed the “climax”—so called because it represents the climax of vegetational development and also because it is the ultimate community to be expected under the conditions of climate for the region. In a climax community the species are so adjusted to each other and the environment that, so long as the over-all climate remains the same, the general character of the community will remain unchanged.

We have emphasized that climax vegetation is preceded by a sequence of changes in dominants which is called plant succession. It should be pointed out that, as with the development of cities, plant succession varies with the habitat in which it is initiated. Unlike the development of cities, however, plant succession in similar habitats follows the same trend because it is controlled by natural laws. It is, therefore, predictable. Also, regardless of the initial habitat, all successional trends within a climatic area are in the direction of climax.

Potentially then one could reason that a climatic region might eventually be clothed with the same vegetation throughout. Actually, this never happens because of differences in rates of successional trends as modified by soils, physiographic irregularities, and erosional processes. Extensive areas are rarely blanketed by continuous and uniform climax vegetation. Catastrophic events like hurricanes or fire also occur periodically and if the vegetation destroyed is climax the successional processes are set back to start over again at a point in the trend determined by the damage to vegetation and the modification of habitat. Nevertheless, some climax vegetation was always well developed locally before man became so marked a factor in modifying natural environments and vegetation. Mettler’s Woods is the nearest to an example of the climax existing in this area. That such an example is available and that it is virgin forest, essentially unchanged by man’s activities, makes it doubly valuable for ecological studies.
We know the history of our big cities but if we were to attempt to explain their origins and development, why they started where they are, why one grew and another disappeared, how they function and what keeps them going, we would want to know all about the contributing factors. We would want to know about the climate, the soil, the original vegetation, the transportation facilities, what the government was like, the products produced, etc., etc. All these would contribute to our understanding and would be involved in the sociological interpretation of such a city.

In plant sociology we seek the explanations of vegetation as it occurs. The history is not recorded, it must be dug out from all possible natural sources. The causes of vegetational responses to environment must be ferreted out and often this involves intensive experimental studies of individual species in all phases of their life cycles. To interpret responses of species we must know in detail what the components of the environment are like. This means measurements of such factors as soil, water, air, temperature, and light in every kind of habitat and again it must be known how the inter-reactions of these factors affect the organisms.

It should be apparent that, in an area disturbed by man, there could be many examples of successional communities in various stages of development. These are useful to the ecologist but to complete his observations he must also know the characteristics of climax vegetation, preferably in virgin condition. This is the point of reference with which to compare and evaluate all other developing communities.

Now again we can emphasize the potential usefulness of these woods and similar virgin vegetation preserved for study in areas where industry and agriculture have virtually eliminated climax vegetation. Even small tracts can be very valuable when their preservation is indefinitely assured. Studies can then be planned for any season and over as extended periods as seems necessary without concern about losing everything to the vagaries of ownership.

Now, for those of you with a persistently practical turn of mind, it should be pointed out that studies of virgin forests or of any natural area may have applications that affect all of us, directly or indirectly. We may here logically restrict ourselves to forested areas. If the principal successional trends and the climax with its variations were well known for a region and all the causes of succession were clearly understood, there could be tremendous practical advantages. Natural vegetation is one of the best indicators of potential land usage under management, and ecological knowledge is increasingly being used in applied fields. In forestry particularly the professional is usually well-grounded on ecological principles which he uses constantly along with his knowledge of the ecology of local vegetation.

When the habitat requirements of a species are known it is obviously foolish to expect big returns from plantations in circumstances differing markedly from natural environments. If a species is known to predominate in a state of succession preceding the climax, a planted stand of it will have to meet the competition of invading species characteristic of later stages of succession. The cost of keeping down this competition will have to
be considered against the desired yield. Species of trees which grow in pure stands in natural circumstances can be expected to do well in plantations, but those which are subordinate in a forest, possibly requiring shade for establishment, will do best in combination with others. These are but a few generalized suggestions of the kinds of applications which can and are being made.

The principles of natural succession do not break down under forest management (or in agriculture or grazing). When it is economically feasible management practices are kept closely in line with natural vegetational changes because these will happen anyhow, or will have to be counteracted. The greater the deviation from natural change, the greater the effort required to control it. The climax forest would thus seem to be the most desirable one in the way of management. But more often than not the species of the climax are not the most valuable for lumber and are usually, in addition, too slow growing to yield in proportion to successional species. Nevertheless, an understanding of climax and its relationships is fundamental to understanding the ecology of all other types of vegetation for the area.

Thus studies in this Hutcheson Memorial Forest will probably not lead to the encouragement of great acreages similar to it. Rather, they will give a greater understanding of the communities which must have preceded it and thus of the successional phenomena characteristic of this area. This kind of research is fundamental and where it has been done elsewhere the applications have amply justified the effort. As I said, these last remarks are made for those who have a persistently practical turn of mind. Almost invariably fundamental research eventually leads to applications. The ecologist is not usually concerned with applications, but at times it is comforting to see phases of one's work applied directly in some applied field.

The saving of this forest and the opportunities it creates for research, now and in the future, will almost certainly be applauded even more in the future than it is today. Those who have made it possible have the appreciation of ecologists everywhere, plus a reasonably high assurance that what is learned here will have significance for all who are involved in managing biological phenomena.
ANIMAL ECOLOGY IN NATURAL AREAS

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What is an animal? Isolated from its environment, it is just a curious bit of protoplasm. Why it does what it does, why it is shaped as it is, why its attributes are what they are, is a complete mystery, undecipherable, if you divorce it completely from any knowledge of the environment where it fits in. In order to put animals into the proper perspective let us take another look at Mettler’s Woods. To date we have heard mainly about its plants. Actually it is a biotic community, a community of plants and animals—you cannot divorce the two. It is an organism, a super organism, if you will, occupying a piece of land. Such a plant-animal organism is soaking up sunlight to lock up, in the form of organic compounds, the elements that it draws from the soil and from the air. I like to look upon all those organic compounds as just cans of energy—a means whereby temporarily some of this sun energy is locked up and held and is prevented from radiating out into space when the clear nights come, and radiation cooling takes place. The whole understanding of one of these communities can best be obtained in terms of that prospect: these units of sun energy tied up by means of water and minerals of various sorts from the soil and carbon dioxide from the air. As this energy is used up, the minerals go back to the soil, to be drawn up again and recycled through the community over and over. All that ever disappears really is that energy which comes in from the sun. It is locked up only temporarily. Ultimately it is released through the metabolic processes of the organisms and radiates out into interstellar space. Of course, some leaching occurs and some of the minerals are lost to the ocean, but in a community like Mettler’s Woods where the balance is a relatively stable one, the loss is small.

Our knowledge of animals is still very fragmentary. We don’t even know as much as we ought to about the few domestic animals upon which we depend for our food—our meat, poultry milk, etc. We are still learning things about those animals. When it comes to the wild animals of the earth’s surface, we know very little indeed about them. As a matter of fact, we are just in the process of finishing up the first job, which is to classify and name them, and to organize that knowledge. This is what we do at a museum where we have specimens of them. There we classify them into families and groups, and work out their relationships and some idea of their evolutionary relationships with the earlier organisms from which they evolved. Actually all we have in a museum is just shells. Literally so in the case of marine organisms. In the case of birds, we have a skin, but what’s that but a shell? In the case of mammals, we have a skin and a skull. But still the animal isn’t there. The animal can be available only out on the land and can be understood only in terms of its role in some biotic community. In the community the animal performs a function in
terms of the over-all life of that community. And if I may draw a parallel, that must not be taken too literally, your body is a community. You have a heart, it has a job to do. You have lungs; you have other organs. Each one of those performs a certain function, does a certain job, and working together they are the animal organism. In the absence of knowledge of the role of the heart or any of the other organs, the isolated organ itself would have little or no meaning. It would be just a curious bit of protoplasm. And so, in terms of the animal in a community, we can evaluate and understand it, only if we go from the laboratory, after we have made our preliminary studies, to the environment where it originated, where it belongs, where it is a functioning member of a community.

Our studies of evolution indicate that most of these organisms have been plastic over the millions of years that life has been evolving and changing. Each organism has been molded and shaped by the forces of its environment. Away from that environment it is impossible to understand why it has these attributes, why its anatomy is what it is. Thus natural communities are essential to an understanding of animal life, especially now that we are deepening our studies in the physiology of animals, animal behavior, animal chemistry, etc.

In the case of these woods we are dealing with a relatively stable community. Here we have an opportunity to study the animals native to such a community in an environment where we know that they have lived in the same setting for a long period of time. Here perhaps we shall be able to explain and truly understand them as functioning parts of a biotic community. Presumably each animal species is still evolving. The idea that a species today is what that species was a 100 or 1000 years ago is, of course, false. We must not think of species as frozen, but ever-changing. We have every reason to believe that the organisms here are still evolving in the direction of a better and better adjustment to the community. Not only the plant community, but also the animals, because an animal is influenced by its associates in the animal community as it is by the plants from which it draws its sustenance. The evolutionary process is, of course, continuing and it is rather interesting to speculate that we might eventually achieve some local sub-species of some of the organisms. Our study of evolution would indicate that many of the new species that have arisen in the past have arisen because of the isolation of a small fraction of a total population on an island somewhere—often as islands in an ocean, but we can also have “islands” in the form of mountains rising up out of deserts. Some day this forest will undoubtedly be an island of mature woodland surrounded by a desert of urban development, an environment not suited to many of the organisms that will persist in the forest.

Areas like this that possess relative stability are very valuable in the study of the natural regulation of animal numbers, a subject about which we know very little. The botanists, of course, encounter the same problem in determining how plants, through competition, establish a pattern of vegetation. We know that there is a successional change in vegetation up to the “climax” that has been spoken of. If we want to study
the natural regulation of animal numbers, it is very helpful if we can find a community in which the setting isn’t changing very much, because any change that takes place in the plant community that provides the habitat is going to throw out our calculations on the regulations of the animal numbers. In other than climax communities some plants will disappear in time and therefore certain species of animals will decrease in numbers if they are dependent on them. Thus I feel that a great deal of our work in the study of the natural regulation of animal numbers will have to be done in communities where we can find relatively stable conditions. We know in most cases that animal numbers are not stable, they either go up or they go down. Often they tend to be cyclic. We know very little about that cyclic phenomenon. But we can generalize and say that in almost every case the population that is maintained is a very minute fraction of what would be possible if the animal increased in the numbers that its rate of reproduction would permit. As an example, take the English sparrow. A few pairs introduced into Central Park less than 100 years ago have exploded into a population of English sparrows all over North America that numbers in the millions. And yet once the population has reached a certain level, any such potential increase of course ceases and the population oscillates around a certain mean. Such studies hold a great interest because man too is an animal occupying an environment that is not indefinitely expandable, and we need to know more about this whole question of population and the natural controls on population. They may give us clues as to why human populations behave as they do.

I could go on and talk about the soil organisms, but Dr. Kellogg has touched on them. We know relatively little yet about the role of many forms of animal life in building soils, maintaining soils, returning the nutrients that are tied up in the organic matter to the plant roots.

Finally I shall touch on the fascinating study of microclimate. The forest is like this auditorium—it has volume, it has a roof—the canopy. In the summertime when the leaves are on the trees, most of them are at the top, receiving the sun and intercepting it. Under this canopy there is a different humidity from outside, different temperatures, different wind velocities. And here there are different settings for the animals than would be present anywhere else. In a mature woodland there are many microclimates. You have not only that just under the canopy, but also in the various layers down to the forest floor; and then under the rotting logs and in the rotting logs and in the hollow trees and in many other little niches—each has its own microclimate in which certain organisms occur. In this woodland we hope to get a part of the over-all picture of adjustment of organisms to these particular peculiar conditions. This whole field of study is in its infancy, and much of it will be difficult or impossible to pursue in the absence of reserved areas like the William L. Hutcheson Memorial Forest.

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FOREST ECOLOGY AND METTLER’S WOODS

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From the standpoint of the forester, Mettler’s Woods, now the William L. Hutcherson Memorial Forest, is uniquely valuable as the best remaining example of old-growth oak forest on the Atlantic seaboard. This quality gives it distinction not only as a museum piece but even more as an outdoor research laboratory in which Nature’s processes can be studied under conditions where man’s interference is reduced to a minimum. Some consideration of the scope and aims of forestry will help to clarify both its potentialities and its limitations for this purpose.

Definitions of forestry are numerous and not always consistent. Many laymen identify it with fire fighting or tree planting. To some foresters it is the growing and harvesting of trees for sawlogs or pulpwood or other commercial products.

I like to think of it as the science, the art, and the business of managing forests for the continuous production of goods and services. Several concepts are packed into that brief sentence, which covers a lot of ground. Perhaps the very fact that forestry has so many facets is one of the reasons why there is so much misunderstanding concerning it. In dealing with so broad a field we all tend to see it from the angle of our own personal contact with it.

To begin with, there is no general agreement as to what constitutes a “forest” beyond the fact that it is a community in which trees are the dominant vegetation. Some include in the community only trees and other woody vegetation, others include all plants, and still others both plants and animals. To me, it is more realistic to regard a forest as an ecosystem which includes not only trees, other plants, and animals, but also the soil on which and in which they grow. It is a particular kind of land area.

Viewed in this light, the forest produces a wide variety of goods and services. Among these are wood and its innumerable derivatives; other tree products such as naval stores, maple syrup, and rubber; decorative materials such as Christmas trees, ferns, club mosses, and wild flowers; forage for domestic livestock and game animals; wildlife of all kinds; modification of the local climate and the microclimate; regulation of the amount and distribution of water runoff, with resulting influence on soil erosion and streamflow; opportunity for many forms of outdoor recreation; aesthetic enjoyment; and spiritual inspiration.

Forestry is properly concerned with the production of any or all of these goods and services—on a continuing basis. Naturally their relative importance varies greatly with time and place. Raw materials for industry, such as sawlogs and pulpwood, have always constituted the major product of the forest in terms of direct financial returns. This fact, together with the fact that we all use lumber and paper in one form or another, has led to the common conception that the production of tangible goods is
the sole responsibility of the forester. Actually the intangible services relating to soil, water, recreation, and inspiration, which it is difficult to express in monetary terms, are extremely valuable and are thoroughly deserving of both professional and popular attention. A friend of mine is fond of saying that we could get along reasonably well without wood but not without forests—a somewhat exaggerated but effective way of emphasizing the fact that there are substitutes for wood but not for forest influences.

Forest management that aims to produce several goods and services from the same area is commonly known as multiple-use, or multi-purpose, forestry. A national forest, for example, may simultaneously produce wood, forage, water, wildlife, minerals, and recreation, and may help to check erosion and floods. Actually there are very few forests that do not, intentionally or otherwise, serve more than one purpose, whatever the primary objective of the owner. Well-managed private forests, for example, generally aim to produce continuous supplies of wood for industrial use, while national parks are set aside to preserve unspoiled examples of magnificent scenery; but in both cases the forests furnish watershed protection and opportunities for recreation. Mettler’s Woods and other natural areas provide aesthetic enjoyment, spiritual inspiration, and favorable conditions for scientific research—all of which are services of superior value.

The advantages of multiple-use are obvious, but there are definite limits to its practicability. Some uses are wholly or partly incompatible. We cannot conduct logging operations in these woods and still retain it as a natural area. We can grow and harvest some wood, forage, and wildlife on the same national forest or private property, but not maximum amounts of each. The more we try to combine uses, the more difficult the task becomes and the more knowledge we need.

These considerations bring us to the heart of forestry, that it is essentially a managerial activity. It involves using—doing something with—a forest. “Use” commonly, but not necessarily, means the harvesting of various crops such as wood, forage, or wildlife. But an area managed primarily for protection of the water supply, or for wilderness values, or for scientific research is being used just as definitely and constructively in the broad sense of the term as is an area which is being managed for the production and utilization of sawlogs or pulpwood. The management of Mettler’s Woods as a natural area constitutes a form of forestry, the products of which are esthetic enjoyment, spiritual uplift, and scientific knowledge.

Scientific knowledge is of course a sine qua non for effective forest management. Whatever product the forest manager is seeking, he must be thoroughly familiar with the characteristics of the plants, animals, and soils comprising the ecosystem and with their relations to one another. Such knowledge is provided by basic research in the biological and physical sciences. Its application is an art requiring a high degree of skill. There is often a wide gulf between knowing and doing, between basic science and applied science. The most brilliant investigator is not always the most skillful practitioner.
The engineering sciences are another field in which the practicing forester must have some competence. Property boundaries must be established, topographic maps must be made, permanent improvements must be constructed, aerial photographs must be interpreted. If timber is to be harvested, logging roads must be located and built, logging equipment must be selected and operated. Where recreation is an important use of the forest, picnic and camping grounds must be laid out, and adequate provision made for sanitation and for protection from fire.

Finally, economic considerations inevitably loom large in the forestry picture. Management practices that do not produce more income than outgo cannot be justified. The relation between costs and returns—present and future, tangible and intangible, private and public—is of vital importance. Either or both are often difficult to express in dollars and cents, but some value must be placed upon them. How much do eroded hillsides and fire-scarred landscapes cost? What are superb scenery and a pure water supply worth? Is the financial return lost by failure to log this forest more than offset by the inspiration and the scientific knowledge that will result from keeping it as a natural area?

Questions like these must be answered by the judgment of the community as to the relative values involved. We are accustomed to making such judgments with respect to city parks, public libraries, art galleries, schools, and churches. We must get used to making them with respect to forests and other natural resources. How the community can best obtain the values it decides it wants raises important questions of policy. Can unrestricted private ownership be relied upon to provide adequate, continuing supplies of timber; to preserve wilderness areas; to protect wildlife; to safeguard the water supply? Or is public ownership necessary? Or can private ownership achieve the desired results with public cooperation and control? In the case of Mettler’s Woods, the answer has been found in public ownership by an educational institution.

All of this brings me back to my original thesis that forestry is a managerial activity involving science, art, and business. Like other forms of land management it uses sound technological practices to achieve certain desired economic and social ends. It rests on the triple foundation of the biological sciences, the physical and engineering sciences, and the social sciences.

The contribution which this forest can make to strengthening that foundation clearly lies in the field of the biological sciences, and more specifically in the science of ecology. This is partly because of the intrinsic importance of ecology, but even more because of the suitability of the area for studies in that particular subject. It is also inevitable that ecological research will extend into the closely related fields of physiology and genetics.

Since the production of forest crops, whether trees, forage, or wildlife, is guided so largely by ecological facts and principles, there appears to be a growing tendency to consider forestry as nothing more nor less than applied ecology. This is going too far. While it is unquestionably true that forestry applies ecology, it also applies pathology and entomol-
ogy and mathematics and engineering and economics. If one thinks only of timber production, it is entirely proper to regard ecology as one of the main foundations for silviculture, which is the art of reproducing and tending the timber crop. But silviculture is only one of the five fields in which the Society of American Foresters believes a forester must have adequate technical training to be recognized as professionally competent. The other fields are forest protection, forest management, forest utilization, and forest economics, which obviously go far beyond the bounds of ecology.

That the Hutcheson Forest maintained as a natural area can contribute substantially to our knowledge only in the silvicultural field in no way minimizes its value from the viewpoint of the forester. This is true in spite of the fact that a forester's activities are so often concerned with modifying natural conditions. Mother Nature if left to herself seldom produces maximum forest crops any more than she produces maximum agricultural crops. It is rather curious, when we are all so familiar with the drastic way in which farming interferes with natural processes, that we should not recognize the desirability of similar interference in the management of forest lands. No one recommends maintaining the "balance of nature" in the production of agricultural crops, yet such a balance is often held up as the goal to be sought in the management of wild lands.

Presumably the balance of nature is the condition established over a long period of time by natural forces operating without interferences by man. It is the climax stage in a successional series of communities. It is not a static condition, but rather one in which the community is in dynamic equilibrium with its physical habitat. Individual plants and animals come and go, but as long as there is no change in climate, or no catastrophe causes a reversion to an earlier stage, the composition of the community as a whole remains approximately the same.

Unfortunately, from some points of view, the climax stage in a natural succession of forest types is often not the one best adapted to man's utilitarian needs. Commonly the earlier stages in succession have greater economic or even greater recreational value. In the field of timber production, for example, white pine in New England, aspen in the Lake States, longleaf pine in the South, western white pine in the northern Rocky Mountains, and Douglas fir in the Pacific Northwest are valuable commercial species which the forest manager often wishes to perpetuate. Yet these are all temporary forest types, or in more technical terms "sub-climax" or "disclimax".

In the field of wildlife management, deer in northern Michigan are far less abundant in an unbroken climax forest of northern hardwoods than in areas where numerous openings create an "edge effect" that provides a more favorable habitat. The reclamation of open fields by forests may completely eliminate such birds as the prairie chicken and the sharp-tailed grouse. In the realm of watershed management, recent studies in the Rocky Mountains have shown that the yield of water is less from dense stands of lodgepole pine than from forests in which holes or strips
have been cut to reduce transpiration and the interception of precipitation. These openings result in the maximum accumulation of snow, from which the bulk of the runoff is derived.

These examples of the value to man of transitional seral stages do not of course imply that he is never interested in the climax forest community. Northern hardwoods in the Northeastern and Lake States, ponderosa pine on dry sites throughout much of the West, and redwood in California are illustrations of climax forest types that the forest manager usually wishes to perpetuate. The important point is that whenever man interferes with natural processes, as by logging or hunting, he must know what results he seeks and how they can best be achieved. Among other things, this requires ecological knowledge of a high order and skill in its application, particularly when the objective is to maintain a temporary stage in the normal succession.

How can natural areas help to supply the needed knowledge when by definition they are to be reserved from commercial utilization? The answer is that in order to modify natural processes successfully we must first know what those processes are. Incidentally it may be well to point out that the Hutcheson Forest is not 100 per cent natural, since the clearing away of the surrounding forests, repeated man-caused fires, and the logging of windfalls after the 1950 hurricane have modified natural conditions in the tract. Furthermore, from now on, sufficient management will presumably be practiced to prevent serious damage to the forest by fire, insects, or disease. Compared with other areas in the region, however, the tract represents, and under the direction of Rutgers University will continue to represent, the closest approach to natural conditions which it is feasible to attain. Herein lies its greatest value.

In an undisturbed forest one can obtain much information not available elsewhere concerning the normal interrelations that exist between trees, shrubs, herbs, fungi, insects, birds, mammals, earthworms, nematodes, soil, and climate. Only in an undisturbed forest can one determine whether the present stand of oak and hickory is really a climax community or whether it will in time be replaced by a stand in which maple and beech are predominant. Yet such information is indispensable for the forest manager, particularly if his objective is, so to speak, to “buck” Nature. Man cannot conquer Nature in the sense that he ever changes natural laws. He can, however, alter materially and successfully the natural course of events if he knows what those laws are and governs his activities in accordance with them.

The need for wisdom in the management of forest lands is emphasized by the long life of the trees which are the dominant element in the community. Dean G. S. Allen of the Faculty of Forestry at the University of British Columbia recently expressed as follows the sobering responsibility which the forester must face: “What we do today and tomorrow will affect generations to come—favorably or unfavorably. We do not know enough yet to work in complete harmony with Nature, and so we will make mistakes. But mistakes can be minimized if we will be exceed-
ingly conservative in the biological sense and follow Nature as closely as we can". (Allen, 1955).

Dean Allen was speaking specifically of silviculture, or timber production, but thorough knowledge of natural processes is also necessary to obtain optimum returns in other fields such as watershed management and recreation. Generally speaking, the more we know the more liberties we can take in modifying the environment to meet man's needs. Much can be learned from controlled experiments in disturbed areas, which will of course continue to be widely used for research purposes. They are, however, not a substitute for undisturbed areas, where studies of natural processes will help us to direct our managerial activities along sound lines. That foresters recognize these truths is shown by the fact that for many years the Society of American Foresters has had a Committee on Natural Areas, and that that committee participated actively in the campaign to preserve these woods from destruction.

How does forest ecology differ from any other kind of ecology? If, as I stated earlier, the forest is the entire ecosystem, then forest ecology is all-inclusive in its study of environmental relations. There is no aspect of the inter-relations between the plants and animals in the forest and the environment in which they live, with which it is not concerned. Coming from a forester, this statement may sound immodest, but I believe that it is realistic.

No one would deny that in ecology as in other branches of biology we need specialists. The other speakers today have demonstrated unmistakably the services that can be rendered by plant ecologists and animal ecologists and soil ecologists. Some of these men will doubtless work in still more specialized fields such as moss ecology and insect ecology and mammal ecology. In these days when we are expanding the boundaries of knowledge so far that it is necessary for most scientists to know more and more about less and less, the specialists are indispensable. So too, I think, are the generalists, and in this particular field I believe that the logical generalist is the forest ecologist.

Management of a forest, whatever the goods or services on which emphasis is placed, has repercussions on the entire forest. We cannot utilize one part without having some effect on all the other parts. Ecology supplies the basic knowledge by which we can determine what those effects will be. It informs the manager as to what steps he can and cannot safely and successfully take. The task of the forest ecologist is to conduct studies that relate to the forest as a whole rather than to its individual parts, although inevitably with emphasis on trees as the dominating feature of the forest. If he does the task well, he will make full use of the findings of other ecologists and will automatically supply information that can be used by the forest manager to direct his activities along sound lines.

Just as forestry is a science, an art, and a business that deals with all the resources in a forest ecosystem, so does forest ecology deal with all
aspects of the inter-relations between the trees, other plants, animals, and environment that comprise the ecosystem. It is characterized both by its broad scope and by the utilitarian character of its ultimate objective. Although recognizing the indispensability of basic research, it is commonly less interested in knowledge as an end in itself than as a means to an end. That end is the continuous production and use of goods and services, among which wood and forest influences will doubtless continue to occupy a prominent position and hence to focus attention largely but not exclusively on the management of the trees in the forest. These considerations make it essential for a forest ecologist not only to have a firm grasp of the fundamental principles of ecology, but also to be familiar with the application of those principles in forest practice. He will be most useful if he is a well-trained scientist who understands the point of view and the problems of the manager.

Many men with these qualifications will in time, I hope, participate in the programs that will be developed at the Hutcheson Forest. Within the limitations imposed by its relatively small size and uniform conditions, it offers unusual opportunities for advancing our knowledge in ecology and related fields. It can thus be a major asset in placing one aspect of forest management in the hardwood region of New Jersey and adjacent states on a firmer foundation than would otherwise be possible.

I congratulate Rutgers University on the acquisition of so unique and so valuable a property. Foresters will follow with keenest interest the research that will be conducted there and will take advantage in their own activities of the results obtained.

LITERATURE CITED
THE IMPORTANCE OF PRESERVING
NATURAL AREAS

PAUL D. SEARS, Chairman
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The growing interest in setting aside and preserving natural areas of vegetation is one of the most encouraging signs of the times. This can be justified on many grounds, not the least of these being the esthetic desire to preserve as much of the rich natural beauty of the land as possible. Unfortunately this motive has only limited appeal to many citizens, particularly those who pride themselves on being practical. So it seems necessary to point out that the esthetic intangible motive is only one of many justifications.

All science grows by measurement and comparison, and for this purpose standards are necessary. The physicist has his standards of comparison for mass, volume, velocity and other attributes. The biologist is faced with the no less serious problem of establishing a standard by which he can measure the capacity of an environment to produce and sustain life. In spite of all our progress, there is no better integration of the forces of the environment than the natural vegetation and animal life produced in a given area. To deprive the biologist of this important norm will seriously cripple him in his essential studies.

In the second place, natural areas represent islands of constructive process in the midst of a landscape which has been subjected to terrific change and pressure from human activity. In such areas the formation and stabilization of soil, regulation of the water cycle and the efficient fixation of energy and organic material go on without interruption.

It is my considered judgment that a far larger proportion of what is now agricultural land could profitably be left in its characteristic natural vegetation. In such an event, of course, it would be necessary to harvest the increment from much of it. But it is equally important to have many of these areas left untouched so that natural processes and values can be conserved and observed. The setting apart of Mettler's Woods is a notable public service and not the least encouraging aspect of it is that responsible leadership in American labor has seen fit to underwrite generously the acquisition of this area.