Abstracts of Urban Forestry Research in Progress - 1979

Urban Forest Research Project
U S D A Forest Service
Northeastern Forest Experiment Station

and

The State University of New York
College of Environmental Science and Forestry
Syracuse, New York 13210

in cooperation with

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ABSTRACTS OF URBAN FORESTRY

RESEARCH IN PROGRESS--1979

Compiled by
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FOREWORD

Urban Forestry, as science and practice, grows daily with new information being developed by both researchers and resource managers. Some of this information is found in publications and scientific journals. Much of it, however, is not yet in a form that can be conveyed through formal channels. By summarizing research in progress, this report keeps researchers informed of ongoing work and helps urban forest managers anticipate results of interest to them.

All individuals and organizations thought to be conducting research in urban forestry were contacted and asked to complete abstracts of their work. The abstracts cover only research in progress at the time of our inquiry in early 1979. Some projects will have been completed by the time this report is received. We regret the time lag between our initial inquiry and the publication of this summary. The section containing studies conducted by the Forest Service research project at Syracuse is current as of the date of this report.

Some omissions have come to our attention as this report goes to press. If this publication proves useful, it is hoped that subsequent summaries of research in progress will be printed and that more complete coverage will be possible. The objective is to open channels between those who do research and those who use the results.

The Abstracts are organized as follows: (1) an unindexed summary of research being done at the USDA Forest Service, Urban Forest Research Project, State University of New York College of Environmental Science and Forestry, Syracuse, and (2) abstracts of other research in progress in early 1979, preceded by an index. These abstracts are categorized by subject, each subject having an assigned number. The index is arranged by subject matter numbers, and indicates the last name(s) of the researcher(s) and the page on which the abstract appears. Within each subject matter the researchers are listed alphabetically.

In this system, if the work deals with more than one topic, a single researcher's name may appear under several subject matter headings in the index. However, each abstract appears only once in the text, and is placed in the category that reflects most closely the primary subject of the research. Reports from research institutions that include abstracts of several different studies have been located in the text according to their subject matter number of lowest value. The subject matter numbers at the top of each page are indicators of ordering sequence only, and do not reflect the full range of topics on that page.

In most cases, the texts for the abstracts were taken directly from the researchers' responses to our inquiries with only minor editorial changes. When necessary, we condensed or took excerpts from

some replies. Those cases are indicated in the text. The amount of information in each abstract varies with the completeness of the researcher's response to our inquiry. Bibliographic entries are only as complete as the replies allowed. We attempted to include the full address, sponsor, starting and completion dates of the study. If the project is a graduate thesis, the student's name precedes the advisor's, which appears in parentheses. In cases where the abstract is too abbreviated or references are incomplete, the reader is encouraged to write directly to the principal investigator for additional information.

The Pinchot Institute for Conservation Studies, USDA Forest Service, Milford, Pennsylvania, funded a substantial portion of the work for this report through the Northeastern Forest Experiment Station. The Urban Forest Research Project of the Northeastern Forest Experiment Station is located on the campus of the SUNY College of Environmental Science and Forestry, Syracuse, and is aided by the many faculty and students of that institution. Professor Donald E. Koten is principal investigator for this cooperative study. Professor Lee P. Herrington conceived the idea for an annual summary of research and worked actively on the project to its conclusion. Ms. George Hopkins Stauffer, Research Associate, was valuable in the organization and editing of the Abstracts, and Ms. Linda Rask assisted in the publication. All of those involved hope that the report improves communication of ideas among the growing community of urban forestry participants.

--ROWAN A. ROWNTREE
JUDITH L. WOLFE

THE URBAN FOREST RESEARCH PROJECT

AT SYRACUSE

The U.S. Forest Service Urban Forest Research Project, located at the State University of New York College of Environmental Science and Forestry, focuses on three general problem areas:

1. the ecological structure and function of urban forest vegetation,

2. how different forest vegetation configurations generate benefits and costs for various sectors of society and how the benefits and costs are distributed over time, and

3. what types of planning and management must be accomplished to achieve the optimum mix of benefits and costs for different classes of cities.

The project was initiated in 1978 and conducts basic and applied research with a core scientific staff supplemented by grants to cooperating researchers. General areas of research are:

1. Inventory and ecological classification of urban forest vegetation and associated soil resources. This work has been conducted primarily at Syracuse, but emphasizes the development of methods that can be applied to other cities.

2. Land use change as it affects urban forest vegetation. An emphasis on patterns experienced by northeastern cities, in particular the emergence of an important residual land resource in the central city.

3. Land use and land use change in the central city as it affects microclimate at the scale of the human being. Emphasis on the urban heat island effect, air pollution, and wind/radiation regimes in the central city.

4. Energy, land use, and urban vegetation. An examination of probable impacts of future energy prices on urban land use and urban vegetation resources.

5. Construction of a theory of urban vegetation ecology as related to land use and land control. Testing of systems analysis for application to urban environments.

6. Determining the most appropriate planning and management principles, models and methods for guiding the distribution of benefits and costs relative to the urban forest resource.

The Syracuse project directs two major studies that will resolve how the state of the art in urban forest science can be applied to (1) a central city situation having air pollution and microclimate problems and (2) an exurban situation where maintenance of environmental quality in the face of urbanization is the main issue. The central city study is being conducted in Dayton, Ohio, with the long term objective of transferring this experience to other cities of approximately the same size. The exurban study is taking place on the Brandywine watershed in Chester County, Pennsylvania, outside Philadelphia. Knowledge from the research foci listed above (1-6) is being incorporated into the Dayton and Brandywine demonstration projects.

The following are abstracts of specific studies being conducted by Project personnel in conjunction with scientists at cooperating institutions.

Development of improved urban forest management programs with emphasis on planning practice

Urban tree resources have a dominant role in the values and environmental impacts of urban space. For example, in Syracuse, New York, urban tree resources are typical of most maturing cities, where urban tree resources have been established concurrently with older residential development. Once vigorous and dense tree populations have now been substantially depleted by disease and aging. Remaining tree populations are disproportionately old-aged and unevenly distributed. During the past decade, substantial urban tree replacement programs have been mounted at considerable expense. However, these efforts have been inadequate to renew and reorder the urban tree resource in keeping with public pressures for improved environmental quality. Now that federal and state support for urban forestry is becoming available to cities, there is a special need for urban forestry academic and agency research to be directed to improved management planning and practice to help cities respond effectively to expanding opportunities. The purpose of this study is to strengthen the base of working information on the physical, natural, and social environment of the city tree-space resource. The study considers the optimal size, distribution, and other characteristics of tree populations for management goals, the present functional life expectancy of replaced trees under present management conditions, and ways of improving management procedures.

Specific objectives: (1) Conduct a 100% sample of street-side trees and planting space (including adjacent land use characteristics) and (2) organize the data for introduction into urban forest planning and management decision making.

Classification of urban forest soils

Urbanization of the landscape, especially in the Northeast, has brought about the need for change in soils classification to emphasize limitations and capabilities of soils for various uses. Existing soil interpretations for nonagricultural use are based on natural soil profiles or those found under agriculture and, thus, have real limitations when applied to the disturbed soils of the urban areas. Up to the present time soils have simply been mapped as "urban land" with no further differentiation between central business districts, inner city areas, and exurban perimeters. Urban foresters have need for a more appropriate and useful soil classification and mapping scheme, so that soil interpretations for urban forestry and related open space uses can be validly developed and utilized.

Specific objectives: Develop, through extensive field sampling and physical-chemical analysis, an urban soil classification system based upon the conditions found in Syracuse, New York, with the ultimate goal of developing a system applicable to other cities.

The Urban Heat Island related to distribution of surface material and vegetation (See Flynn, page 17.)

Changes in urban physical morphology and microclimate: 1950-1980 (See Wolfe, page 19.)

Energy costs and the urban forest ecosystem - I

There is an interdependent relationship between urban land use and the urban forest. On the one hand, the pattern of urban land use determines the structure of the urban forest ecosystem. On the other, aspects of the urban forest determine what land uses will occur in certain parts of the city. Thus, the land-use and urban forest systems are "coupled," and, in addition, both systems are dynamic and evolving rather than static.

It is clear that urban forest planning requires knowledge about future states of the urban land-use system. To predict these future states, it is necessary to understand the factors governing land-use change in the city. These can be categorized broadly as social, political (including legal, legislative), and economic. One of the most important factors in the economic sector (but

permeating the social and political sectors as well) is the steadily increasing price of conventional fuels.

It appears to be a common assumption that the prices of the important conventional fuels (natural gas, coal, petroleum, uranium) will continue to increase over the next 10 to 20 years. It is suggested, furthermore, that increases in energy cost will figure prominently in future land-use changes. In a symposium on this topic, there was little agreement on whether the American city would continue to suburbanize, recentralize, or articulate a pattern somewhere in between ("Future Land Use: Energy, Environmental, and Legal Constraints", Burchell, R. W., and D. Listoken, eds., Center for Urban Policy Research, Rutgers University, 1975).

Specific questions pertaining to cities in the Northeast are: (1) Will industries that rely heavily on certain fuels leave the region, or significantly reduce production and employment? (2) Will areas of oldest housing in the central city be economically uninhabitable because of (a) low and fixed income tenants, (b) capital costs of retrofitting these residential structures for energy efficiency, (c) deregulation of prices of home heating fuels. And, if so, what effect will demolition of these structures have on the urban environment and on the requirements of urban forest planning? (3) Will the use of cordwood for home heating change the value of near-urban wooded lands, and what secondary effect will this have on suburban residential development? (4) Will leisure time be spent in different ways and change demands for different categories of urban land use, such as open space, indoor recreational, etc.? These four questions are examples of how land-use changes brought about by increasing energy prices will impact urban forest planning and management.

Specific objectives: From a review of existing literature and data, estimate price increases for conventional fuels for residential, commercial, transportation, and industrial consumption sectors; develop a generalized "energy budget" for the Syracuse metropolitan area (energy budget = sector consumption by fuel type); estimate, in terms of land use/ownership/control, impacts of predicted price increases on each consumption sector.

Energy costs and the urban forest ecosystem - II

Within the last decade, energy costs have become a major determinant of urban land-use decisions that are changing both public and private sector behavior toward the ownership, use, and control of land in the metropolitan area. Urban natural resources planning, including urban forestry management, must now consider the manifold aspects of energy costs and interruptions in supply of con-

ventional fuels. Long-term planning of the urban system will need to confront shifts in technology, changes in emissions regulations lifestyle modifications of urban residents, and a diminishing capacity of the city's public sector to provide services. Demands for maximizing benefits of urban vegetation at least cost must soon be met by understanding the energy implications and by examining specific aspects of urban forestry planning and management that can increase the efficiency of a metropolitan area's energy budget. Consideration will be given to questions of energy production and consumption relative to urban vegetation within the context of the urban land-use system. This study continues work that was begun under Cooperative Agreement 23-083 and will employ Onondaga County, New York as a case system. The methods and model developed in the study will have application to other metropolitan systems in the U.S.

Specific objectives: (1) Develop a model to relate energy use and availability; land ownership, use, and control; relevant lifestyle factors of county residents; and urban vegetation management. The model is to be used for simulating future changes and is to be evaluated as a tool for urban natural resource planning and management. (2) Identify and examine one major problem of land-use change and urban forest management on which to focus investigations of a more precise nature. Candidates are: (a) increasing amounts of vacant land in the central city, (b) changing land economics of near urban woodlands, (c) loading of multi-use demands on urban and near-urban greenspace and woodlands, (d) need for highly efficient urban natural resource and vegetation management plans as part of countywide energy management planning processes, and (e) likely impacts of wood burning on composition, condition and management of near-urban woodlands. (3) Construct a specific research agenda in the area of energy, land use, and urban forest planning/management to be implemented by Work Unit 1904 over the next 5 years. The agenda shall be written following the format of Forest Service problem analyses.

A computer-graphic analytic method for ecological land-use planning and management

Comprehensive planning and management of urban forest resources requires an automated data processing capability that can integrate a number of variables (biophysical, economic, demographic, etc.) for geographic display and analysis. This capability is necessary for (1) inventorying soils, slope, ground water, etc. in conjunction with the spatial distribution of the urban forest and associated vegetation; (2) analyzing spatial relationships among a range of factors associated with the functioning of the urban forest resource; (3) displaying and evaluating alternative

urban forest/land-use configurations. A computer-graphic method is needed that can be used for both urban forestry research and for urban forestry planning/management decision making. Recently, a computer-graphic method has been developed at Harvard University that is designed for both research and planning: the IMGRID system.

Specific objectives: (1) Acquire the IMGRID system at SUNY-CESF and train selected researchers to employ it for urban forestry research and applications; (2) test and refine the system using a Syracuse-based data set in preparation for application to the second (planning) phase of the Brandywine studies.

Translation and transfer of information for use in planning and management of municipally-owned urban forest resources

This study is an outgrowth and extension of Cooperative Agreement 23-001. The purpose of 23-001 was to collect and interpret base information on the streetside greenspace resource and the city's street tree replacement program, and to acquire base information for identification of additional management-oriented research appropriate to this subject area.

The next logical phase of investigation is to translate and transfer information for use in the city street tree planning and management process. Management of the public street tree resource involves the interaction of management agency objectives and constraints with public values and inputs. Technical information on the resource and its management options is a significant third factor to the extent that it can be effectively incorporated in the agency/public process.

Specific objectives: (1) Analyze further the streetside space and tree resource data from the preceding study, with particular attention to its interrelationships with other information available, such as operations records of the managing agency (Syracuse Department of Parks and Recreation) Department of Transportation data and plans, utility companies' data and plans, census and other city information, and existing data and plans from Syracuse Department of Community Development. (2) Examine further the present street tree management and replacement process in Syracuse as it reflects agency objectives and constraints and public values and inputs, in order to identify needs for improved resources information and the appropriate levels and formats of such information. (3) Develop planning and operational processes for incorporating appropriate resource information into the process of interaction between city and citizens. (4) Compare the results of

this study with available information on street tree management of other cities to identify unique versus more universal elements in this Syracuse case study.

The vacant land component of urban land use change models

There is an interdependent relationship between the urban forest and urban land uses. Existing vegetation influences the location of various land uses and residential groups through the mechanism of environmental preferences and land values. Conversely, the form and distribution of urban land uses determine the structure of the urban forest by providing a matrix within which vegetation can be located and managed. Also, certain species may be more successful when located near certain land uses, or the public may express preferences for particular species near particular land uses.

The development of an urban forestry management plan requires knowledge of the distribution of land uses in American cities. Concepts of spatial and temporal patterns of land use change and their relationship to the urban forest are necessary in order to anticipate future urban forestry management opportunities and problems. There are a number of factors governing urban land-use change: land values and the changing demand for various categories of land use, the changing structure of the city's economy, the condition of existing buildings, property taxes, public intervention in the urban land market, and the increasing cost of energy. Also, social variables, such as the changing distribution of various social, economic, and age groups within the city and their preferences for various residential locations, forms of tenure, and environmental preferences regarding vegetation and aesthetics, add other dimensions to the urban land market and the resulting distribution and intensity of land uses.

Vacant and unbuilt land presents a new and possibly important opportunity for urban forest and vegetation management. Much vacant land and transitional uses, such as parking lots, are located in the core areas of older American cities. Some property is publicly owned and awaiting urban redevelopment, but other properties remain vacant because their location and size do not justify the expense of redevelopment. An understanding of the economic viability of existing buildings in the urban core, especially older rented structures, is necessary in order to anticipate future demolitions and the production of vacant land. Hence, this research will concentrate on cities having a significant number of old residential structures.

Specific objectives: (1) Evaluate existing research on urban land-use change and the effects of urban land use on the distribution and function of the urban forest. (2) Evaluate the distribution of and demand for selected land uses in older American cities. A first stage objective will focus on the creation of vacant land in the urban residential core. Particular attention will be given to cities having a large quantity of vacant land or a significant number of obsolete or near-obsolete structures, or cities where a significant proportion of the housing was constructed before 1945. This objective deals with, but is not limited to, the identification of sites for possible urban afforestation. (3) Construct a model of recent and future urban land-use change that incorporates the economic, social, and political variables necessary to understand this phenomenon. This includes the consideration of urban land values, demand for various categories of land uses and locations, the demand for certain residential locations, property taxes, public intervention in the land market, and the increasing cost of energy as it affects the distribution of land uses through transportation and the economic viability of existing buildings.

Silvicultural systems for nonindustrial private forest lands in an urbanizing county

The Brandywine watershed in southern Pennsylvania provides special opportunities for studying the management of Nonindustrial Private Forests (NIPF's) in urbanizing areas. These lands contain valuable timber resources that could help alleviate predicted timber supply shortages in the future. Nationwide, some 296 million acres of commercial forest land, which amounts to 58 percent of the total commercial forest, are owned by private individuals or nonindustrial corporations. Many of these owners are located on the fringes of metropolitan regions and seek to retain and manage their forestlands in the face of growing pressures for urban land development. While timber is a valuable product of these lands, other benefits, such as wildlife habitat, nature preservation, visual aesthetics, and both passive and active recreation, must be incorporated into the list of management objectives.

Chester County, on the Brandywine watershed, has attributes valuable for studying management of NIPF's: (1) the area is almost completely owned by private individuals in relatively small parcels, (2) the ownership objectives are characteristic of the diversity that could be expected in most regions of the country, (3) through the efforts of the Brandywine Conservancy, there is an enhancement of appreciation of the value of a true conservation ethic in the area, and (4) various easements on the floodplain of the Brandywine preclude development, and render forest management an attractive alternative on sites subjected to periodic flooding. Chester

County is the site of a multi-disciplinary urban forestry project; this study will constitute the silvicultural core of that larger project.

Specific objectives: The overall purpose of this study will be to develop flexible, usable silvicultural plans to guide the long-term management of forest stands representative of those in the area and characteristic of the ownership objectives that exist in the area. The specific goals of this study will be as follows: (1) characterize the forest stands of the region by site class, age, condition, and species composition; (2) identify the range of ownership objectives for lands held for long-term forest management purposes; (3) develop scientifically based silvicultural plans covering entire rotations that account for the diversity of ownership goals in the area, perhaps by individual stand type.

Structure, development, and silviculture of mixed stands in a suburban region

The general purpose of the research is to improve the understanding of the structure and development of complex mixtures of hardwoods so that their silvicultural management can proceed on a sound basis within the context of a suburban region. The forests that develop on the deep soils of the Brandywine Valley between Philadelphia and Wilmington are deemed to be some of the finest existing examples of the Appalachian Forest formation, which extends from New England to Alabama and covers much of the Boston-Washington Megalopolis. There are few forests outside the humid tropics that are more complicated and, therefore, more difficult to understand. The existing forests do not seem to fit the simple concept of pure (single species) even-aged stands in which all the trees have their crowns in a single canopy. Neither do they commonly seem to fit the other long-standing interpretation of complexity of forest-stand structure; that is, the concept of the uneven-aged stand, which would have to consist of small groups of trees with very different total heights for each group.

Specific objectives: (1) Test the hypothesis that these forests consist of even-aged aggregations of trees (not necessarily even-aged stands), which develop in a vertically stratified structure in which the different species tend to occupy different strata by reason of different regimes of growth in height. (2) Determine the extent to which the vertical arrangement of foliage in certain typical stands represents adaptations that lead toward optimum use of available light by the forest vegetation. (3) Determine how the distribution of tree diameters and other measurable attributes of even-aged stands or aggregations change with increasing age. (4) Construct estimated yield tables of timber volume for different

stand ages. (5) Assist other cooperators with the formulation of schemes of silvicultural management appropriate to the forests of the Brandywine Valley and the objectives of the various kinds of owners of such forests.

Construction and review of urban forest management models for climate, energy, and attractiveness in Dayton, Ohio

Northeastern cities face three environmental problems that can be solved in part by urban forest and vegetation management: (1) to minimize aggregate urban energy consumption, (2) to ameliorate the urban microclimate and reduce air pollution, and (3) to improve the general attractiveness of the central city to both residents and transients. In order to develop a management plan for urban forest vegetation that can contribute to the solution of these problems, it is necessary to construct models that will estimate the quantitative effects on (1), (2), and (3) of any given urban forest configuration and management strategy. The construction and review of these models must take place in a practical context that will enhance the chances of any resulting plan being implemented.

The general purpose of this study is to develop models necessary for urban forest management in Dayton, Ohio. The plan which results must be constructed in close association with the scientific limitations and economic, political and social realities of the city. The study will fund one scientist who will work in conjunction with the City Manager's Office for 1 year.

Specific objectives: Construct and review a model or models that test(s) the effectiveness of different urban forest configurations (and associated management strategies) in reducing aggregate urban energy consumption, ameliorating the urban microclimate, reducing central city air pollution, and enhancing the general attractiveness of the city.

Development of descriptive successional models for forest communities in an urban county, Central New York

Forest community succession in urban counties is poorly understood because of a complex pattern of interference by human activity. Yet, the planning for management of urban forest communities requires knowledge of what forest conditions will be in 20-25 years. Woodlands around metropolitan areas will experience more intensive use in the near future as rising energy costs make these forest types more attractive for recreation, wood production, and a number of greenspace resource uses. Managers must be able to predict community attributes of at least the most important types. The

purpose of this study is to develop the scientific knowledge for this predictive capability.

The study will begin with a classification of the more important forest communities in Onondaga County, New York. The taxonomy will employ dynamic criteria pertinent to other areas in Central New York. The methodology will be developed so as to make it applicable to an even larger universe of cases dealing with urban or urbanizing counties. For this type of study a county unit is logical from the standpoint of inventory and sampling, as well as being appropriate for inclusion in a county land-use and resource management plan.

Specific objectives: (1) Evaluate existing classifiction schemes that may be applicable to the Onondaga County situation. (2) Produce a taxonomy of forest communities in Onondaga County, New York, from existing field plots, surveys, and air photos, and refine this taxonomy with additional field sampling and interpretation during the period of the study. (3) Develop descriptive successional models for the important forest communities based on an understanding of biologic and anthropogenic factors. The models will be constructed to accommodate quantification with additional study.

Study to identify and characterize selected client groups for urban forestry knowledge (See Koten and Rowntree, p. 66.)

Integrating urban forestry options into comprehensive land-use planning: modeling and implementation

and

Integrating urban forestry options into comprehensive land-use planning: concepts, methods, and principles

Comprehensive land-use planning now occurs at city, county, regional, and statewide scales; and urban forestry science has advanced to the point where it is now possible to incorporate strategies for managing urban forests and associated vegetation into the comprehensive land-use planning process. In order to do this, it is necessary to identify and develop appropriate concepts, principles, and methods that will integrate urban forestry knowledge with land-use planning at different scales of operation.

Concepts and models of spatial and temporal patterns of urbanization over a planning period of 20 years must be developed along with the ability to account for perturbations due to policy shifts and changes in the distribution of location costs. A range of

urban forest options that can produce varied benefits to present and future populations must be modeled in terms of costs and who will bear those costs. Methods of dealing with various degrees of uncertainty in all areas of the planning and management process should be incorporated into these models. Legal, jurisdictional, and institutional measures can be evaluated to determine the most effective means of implementing sound programs of urban forest/vegetation management and land-use control.

Specific objectives: For the first study: (1) Model future land-use changes in the presently undeveloped area lying between Philadelphia, PA, and Wilmington, DE, for the period 1980-2000. Refine this model so that it can be applied to other large metropolitan regions. (2) Evaluate existing environmental impact models to determine which provide the resources for building a new model that can predict two-way interactions between urban forest ecology and urban land uses. (3) assess existing legislation, institutional arrangements, and jurisdictional constraints bearing on the integration of urban forestry options with comprehensive land-use planning. For the second study: (1) Evaluate concepts relating to spatial and temporal development patterns over the next 20 years for the Philadelphia-Wilmington metropolitan area in such a way that these concepts can be applied to other large urban regions in the United States. (2) Identify probable influences on development patterns in the Philadelphia-Wilmington region that could have spatial or temporal implications for the urbanizing process. These influences could be, but are not limited to, policies bearing on land use or costs (such as energy, building, or transportation) of spatial location. (3) Construct a conceptual and methodological framework that identifies and relates questions and issues bearing on the integration of urban forestry into the comprehensive land-use planning process. These questions and issues deal with, but are not limited to, the types of urban forestry options that can be incorporated into land-use planning at the county or regional scale of operation, and the costs associated with each option. In particular, methodologies for incorporating nonpriced benefits such as wildlife habitat and aesthetic values of woodlands must be identified and assessed. (4) Develop a system for understanding the distribution of both priced and nonpriced benefits and costs of urban forestry options among present and future landowners, local communities and the larger public interest. This system can be seen as interfacing with a system of existing and proposed institutional, jurisdictional, and legal means of implementing urban forestry options.

Comparative profiles of the operations and information utilization of urban forestry programs

The need for more reliable technology transfer mechanisms among operational sectors of urban forestry is being increasingly recognized. Research agreement #42-269 ("Study to Identify and Characterize Selected Client Groups for Urban Forestry Knowledge") attempts to identify some of the factors bearing on information transfer. To complement this identification process, the present study proposes to collect, through a survey, information on the organization and operations of a sample of urban forestry programs that are broadly representative of the full range of the most active and successful programs. This will include an overview of all published material as well as on-site interviews or surveys of people involved with the administration of the various programs. We hope that information regarding the organization structure, the relationships with other groups (both governmental and private), and the experiences of different programs can be compared and analyzed so as to reveal the effect various factors, including technical information, have on the success of a program.

Specific objectives: (1) Identify and measure the relative potency of the economic, political, social, and administrative factors that determine the effectiveness of urban forestry programs in a sample of eight sites in the conduct and effectiveness of these eight urban forestry programs. (2) Identify technical information needs that can be met by planning and management research in urban forestry, from this examination of eight programs.

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1.0 Benefits

URBAN FORESTRY RESEARCH IN THE SOUTH (1.0/3.0)

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The research project will encompass two problem areas: (1) identification and evaluation of the social and physical benefits from urban forest management and (2) development of guidelines for establishing and managing urban forest vegetation. Problem 1 will involve both economic and psychological measurement techniques and theory application. Problem 2 will be approached strictly from a biological basis. Both problem areas will be pursued from the premise that experience with problems already existing in heavily populated regions and improved urban forest management in the developing South can help prevent problems in other heavily populated, urbanized regions.

A STUDY OF THE RELATIONSHIP BETWEEN THE URBAN HEAT ISLAND AND THE SPATIAL DISTRIBUTION OF THE URBAN FOREST (1.0/1.11/3.0)

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Sponsored by: USDA Forest Service, Northeastern Forest Experiment Station, Syracuse, New York

Starting and completion dates: 1978-1979

The Urban Heat Island (UHI) occurs throughout the year in most urban areas. It varies both spatially and temporally in magnitude and form. It is caused primarily in the nonwinter months, by excessive heating of urban air by the ground surface. This is due to the alteration of the energy budget within urban areas such that the net radiation gain in the daytime increases over that of rural areas. Essentially, evaporative surfaces (vegetation) with low heat capacity and low conductivity characteristic of rural areas have been replaced by nonevaporative surfaces (building materials) with high heat capacity and high conductivity characteristic of urban areas. This results in increased storage and sensible heat components in the energy budget. The energy budget and subsequently the magnitude of the temperature anomally (UHI) of an area will be determined by the distribution of

surface types and the partitioning of their energy characteristics. This study quantifies the spatial distribution of vegetated and non-vegetated surface types within the urban areas, and explores the relationship between intraurban variance of the UHI or local thermal environment and spatial pattern, land use, population, and topography.

STOMATAL RESISTANCE OF URBAN TREES (1.1/2.4)

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The evaporative heat sink provided by transpiration from urban trees is probably an important part of urban mesoscale energy budgets. However, there is little information about the rates of transpiration of urban trees. Measurements of stomatal resistance of leaves can indicate transpiration rates and also identify physiological stress in urban trees due to limited moisture availability. Stomatal resistance of two tree species, green ash (Fraxinus pennsylvanica) and red maple (Acer rubrum), planted in a parking lot will be measured with a diffusion porometer. Simultaneous measurements of soil and atmospheric variables will be analyzed to determine effects of these variables on diffusive resistance.

CHARACTERIZATION OF WINDBREAKS FOR THE NORTHEAST (1.11/3.31/1.21)

HEISLER, Gordon M. and MILLER, David R.
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The Pennsylvania State University
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Wind tunnel modeling can be used to study the relative effectiveness of different tree windbreaks and windbreak locations for reducing house space heating energy use. The value of wind tunnel studies would be enhanced if windbreak models could be made to represent more assuredly windbreaks at full scale. Similarity between model and full scale can be achieved by parameters of permeability derived by comparing wind profiles in the lee of shelterbelts with upwind profiles. This study will include a search of existing literature for such wind profile data and calculation of permeability parameters from that data. Additional wind profile data will be collected in the field to complete the picture for windbreaks of the northeastern United States. Windbreaks will be

described in terms of species, size arrangements, and permeability parameters including, CD, the drag coefficient.

ENERGY BALANCE AND MICROCLIMATE OF THE FOREST-URBAN EDGE (1.11)

MILLER, David R.
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Storrs, Connecticut 06268

Starting and completion dates: December 1977-1978

The components of the two dimensional energy budget at a hardwood forest edge are modeled and analyzed. Field experiment results indicating the magnitude of the various energy budget components at forest-development interfaces are presented. The usefulness and application of this type of knowledge to aid in minimizing the local environmental impact of developments in forested areas is discussed.

CHARACTERIZATION OF WINDBREAKS FOR THE NORTHEAST (1.11/1.21)

MILLER, David R.
University of Connecticut
Storrs, Connecticut 06268

Starting and completion dates: 1979-1979

To describe porosity parameters with geometry similar to that necessary for winter protection of houses in the northeastern United States.

CHANGES IN URBAN PHYSICAL MORPHOLOGY (1.11)

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Sponsored by: Northeastern Forest Experiment Station, Urban Forest Research Project, Syracuse, NY

Starting and completion dates: June 1978--October 1979

1.12 Noise

This study deals with the usefulness of one parameter of land use, --urban physical morphology, the spatial arrangement of structures, streets and vegetation --in the understanding of the functional relationship between the urban land-use system and the urban forest system. The relationships between urban physical morphology, changes in the distribution of the urban forest and the modification of the street-level microclimate in the Central Business District of the Syracuse, New York, study area, are examined with reference to their impact on the user population.

Response to the changes in the street-level microclimate of the study area is considered through a thermal balance for an individual. The greatest changes seem to occur in insolation regimes received at ground level and in increased wind speeds over the years. Data from the U.S. Census (1950-70) indicate that the user population may be different from that in the past, being characterized by increasing age and lower current income. This study is relevant to findings that the incidence of heart attacks increases in cold weather for older people and that the ability to deal with weather extremes resulting from changes in physical morphology diminishes with poor nutrition, a condition which is often associated with people living on lower incomes.

The study suggests that a class of American cities, with Syracuse as an example, has produced during the last 30 years urban core environments that involve higher levels of human thermal stress.

TREES AND SHRUBS - BARRIERS FOR NONBENEFIT CONTROL (1.12/3.32)

READ, Ralph A.
Rocky Mountain Forest and Range Experiment Station
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Trees, shrubs, and solid barriers used in various combinations effectively shield highway rest areas, parks along interstates, residential areas, and urban areas from the noise of normal passenger cars as well as truck traffic. Reductions of 4 to 7 decibels (about two-thirds as loud) are possible with dense plantings of shrubs with taller trees. A further 2 to 3 decibel reduction may be obtained by the addition of solid barriers.

Tree improvement research by the author applies to developing species (for example, Scots pine (Pinus sylvestris), Douglas-fir (Pseudotsuga menziesii), eastern white pine (Pinus strobus), Austrian pine (Pinus nigra), and red pine (Pinus resinosa) resistant to diseases and insects, and adaptable to the plains environments for practical use.

1.12 Noise

AN ANALYSIS OF THE IMPACT OF FORESTS ON THE CONTROL OF THE URBAN ACOUSTIC ENVIRONMENT (1.12)

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Sponsored by: The Consortium for Environmental Forestry Studies

Starting and completion dates: June 1, 1978-June 1, 1979

The Noise Control Laboratory of The Pennsylvania State University has conducted research in forest acoustics sponsored by the Pinchot Institute for 4 years. Substantial contributions under Pinchot Institute sponsorship have also been made by the State University of New York College of Environmental Science and Forestry at Syracuse. Many others have contributed to this research effort, notably Professor David Cook of the University of Nebraska under U.S. Forest Service sponsorship In general, the goals of the research projects, as originally proposed, were more than adequately met. In most cases, however, considerably larger volumes of data were collected than could be completely analyzed with the funds and the manpower available at the time. Numerous publications have resulted from these past research efforts and have resulted in considerable public interest.

The findings to date by the various researchers are sometimes contradictory. We believe, however, that the data collected in the research efforts were very carefully taken and that much can be gleaned from further extensive analysis. We believe this to be essential at this time to provide a better assessment of the role of vegetation in the control of noise in the urban environment.

This year's research effort by the Noise Control Laboratory at Penn State under the sponsorship of the Pinchot Institute is devoted primarily to thorough analysis of previous data, resolution of discrepancies, and the preparation of publications that will disseminate the best available information to the scientific community and to decision makers.

Citations of publications produced from this project:

Reethof, G. and O. H. McDaniel. 1980. Acoustics and the urban forest. In Proc. National Urban For. Conf. 1978, Washington, D.C.

Borthwick, J., H. Halverson, G. M. Heisler, O. H. McDaniel, and G. Reethoff. 1978. Attenuation of highway noise by narrow forest belts. Final Rep. Fed. Highw. Adm., FHWA-RD-77-140.

Carlson, David E. 1978. Theoretical and experimental analysis of the acoustical characteristics of forests. Unpublished M.S. Thesis.

PARTICULATE CONTAMINATION AND URBAN TREES (1.13)

SMITH, W. H.
Yale University
New Haven, Connecticut 06520

The most damaging levels of air pollution are reached in industrial and urban areas. Atmospheric contaminants in metropolitan areas include both particulate and gaseous pollutants. Since trees have evolved in the presence of numerous materials presently considered air pollutants, and since trees are frequently abundant in urban areas, it has been speculated that trees may function as effective sinks for trace contaminants. Mechanisms for removing particulate matter may include sedimentation on tree surfaces, impaction on tree surfaces and precipitation transfer to tree surfaces. Mechanisms for gaseous removal may include uptake via plant pores and surface absorption. Sufficient potential for this sink function is indicated to justify consideration of this amenity function in tree selection and breeding programs for metropolitan trees.

VEGETATING THE COMPLETED SANITARY LANDFILL (1.14/2.3/2.12)

GILMAN, E. F. (Ida A. Leone)
Rutgers University
New Brunswick, New Jersey 08903

Sponsored by: U. S. Environmental Protection Agency

Starting and completion dates: 1978-1979

During the last 5 years, many attempts to revegetate completed sanitary landfills have been undertaken throughout the United States, with various degrees of success. This study was undertaken to determine which woody species, if any, can maintain themselves in an anaerobic landfill environment; to investigate the feasibility of preventing landfill gas from penetrating the root zone of selected species by using gas barriers; to identify the (those) factor(s) which is(are) most important in maintaining adequate plant growth on completed sanitary landfills. Of the 19 species growing on a 10-year-old landfill for

the past 2 years, certain species have tolerated the landfill better than others. Of five gas barrier systems tested, three prevented landfill gas from penetrating into the root zones of the trees.

EFFECTS OF SUBURBAN DEVELOPMENT ON WATERSHED HYDROLOGY (1.15,3.32)

CORBETT, Edward S.
USDA Forest Service
Northeastern Forest Experiment Station
The Pennsylvania State University
University Park, Pennsylvania 16802

Suburban encroachment on municipal watersheds and other forested and agricultural lands is common and affects both water quality and quantity. This study will evaluate changes in rainfall-runoff relationships in small watersheds during suburban encroachment, and changes in water quality as a function of land-use change. A portion of this work is being conducted through cooperative studies at Rutgers University and the Baltimore, Maryland, Municipal Watershed.

PARKING LOT RUNOFF IMPACT ON WATER QUALITY IN A SUBURBAN STREAM (1.16)

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Sponsored by: The Consortium for Environmental Forestry Studies

Starting and completion dates: April 1, 1978-September 1, 1979

The purpose of this study is to determine the effects of parking lot runoff and stream channelization on instream water quality parameters in the vicinity of a suburban shopping mall.

The literature contains no reference to the impacts on temperature and other water quality parameters when a natural stream receives parking lot runoff waters, although it is suggested that temperature increases during storm runoff periods. The existing opportunity and some initial measurements made during the summer of 1977 indicated that a highly successful study may be conducted within a short period with minimal resources. Primary measurements were made with a YSI Salinity-Conductivity-Temperature meter, and air temperature, stream stage, and weather conditions were recorded. At intervals pH, CO, CO_2, NO_3, PO_4,

alkalinity, hardness, silica, iron, and chlorides were tested with a LaMotte Chemical Company Field Test Kit according to standard methods.

The study site meets prime criteria for such a study: it isolates surface and subsurface runoff from the parking lot of a suburban mall; the stream may be readily monitored (1) where it is in its natural state, (2) where it receives surface runoff, and (3) where it is concrete-lined and receives surface and subsurface runoff. It is readily accessible, and down wind from the principal investigator's home and work locations. This location will enable early warning of storm events. The compactness of the site permits complete manual monitoring of primary quality parameters on a 15-minute cycle.

Sampling will be on three bases at the sites indicated: a) a long-interval background level; b) an intense temporal schedule during storm events; and c) a widespread watershed quality survey.

The study will be coordinated with another project involving application of parking lot runoff waters to soil columns and with a study involving the quality of the runoff water.

MANAGEMENT OF MUNICIPAL WATERSHEDS (1.16/3.32)

CORBETT, Edward S.
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Northeastern Forest Experiment Station
The Pennsylvania State University
University Park, Pennsylvania 16802

Multiple-use under heavy demand characterizes municipal watersheds. Their managers have the primary responsibilities for producing an income from timber growth and of meeting recreation demands to the extent possible. Many municipal watersheds constitute the principal forested area within the urbanized domain. Studies are being conducted to evaluate the impacts of municipal watershed land management practices on water quality and aquatic habitats. The effects of vegetation type conversions on storm flow characteristics, as well as on this work, is being conducted through cooperative studies at Penn State University and at the Baltimore, Maryland, Municipal Watershed.

CONTROL OF THE MICROCLIMATE AROUND BUILDINGS FOR IMPROVING THEIR ECONOMY, UTILITY, AND ENERGY EFFICIENCY (1.21)

1.21 Energy Conservation

ARENS, Edward
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Sponsored by: NBS and ASCE

Starting and completion dates: December 1978-December 1980

A task committee of the ASCE subcommittee on architectural aerodynamics has been formed to prepare a state of the art report on the "Control of microclimate around buildings for improving their economy, utility, and energy efficiency." The duration of the task is 2 years. The current members of the task committee are Edward Arens, Jon Peterka of the environmental wind tunnel facility at Colorado State University, Hassan Nagib of the fluid dynamics department at Illinois Institute of Technology, and Douglas Coonley of a private design firm in New Hampshire.

The list of topics to be investigated for possible inclusion in the report are:

Pedestrian acceptability of outdoor built environment.

- tall buildings, stadia, open space
- comfort criteria for cold and hot conditions
- design techniques to assure satisfactory environment

Energy implications.

- whether or not to enclose and condition space (based on comfort characteristics)
- natural ventilation at building and site scales (is it feasible, if so, how?)
- fan efficiency (exhaust and cooling tower)
- infiltration and heat loss (building configuration and site measurement)
- wind data for computer simulation of building energy requirements

Air pollution dispersal.

- exhaust recycling in the immediate vicinity of buildings
- street canyon pollution

1.21 Energy Conservation

Air flow within buildings.

natural ventilation paths
the neutral point as a function of wind and stack effect
infiltration/exfiltration

Wind created noise.

Hazards to aircraft landing in built-up areas.

HOME ENERGY CONSERVATION WITH LANDSCAPING (1.21)

CORDELL, H. K. (USFS) and MIXON, John (Georgia Forestry Commission)
Forestry Sciences Laboratory
Carlton Street
Athens, Georgia 30602

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Sponsored by: USDA Forest Service and Georgia Forestry Commission

Starting and completion dates: November 1, 1978-December 31, 1980

Determination of dollars saved, energy saved, and homeowner's and resident's comfort levels under various landscape conditions in the southern states, especially Georgia.

USE OF URBAN VEGETATION TO CONSERVE HOME HEATING AND COOLING ENERGY (1.21)

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The Pennsylvania State University
Room 106
Land and Water Research Building
University Park, Pennsylvania 16802

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Sponsored by: The Consortium for Environmental Forestry Studies

This abstract is a summary of several completed and ongoing research projects conducted at Penn State. Research here has been focused on the use of shade trees and windbreaks to reduce energy consumption for home air conditioning and heating. Most field studies have involved using small mobile homes to assess vegetation effects. A unique method

of monitoring air infiltration has also been used to monitor heat exchange by air movement through cracks and openings in a home. Complete projects resulting from this research are:

1. The effects of forest vegetation on microclimate within the metropolitan complex, 6/73 to 8/76. Experiments were conducte to determine the effects of a pine forest on home heating energy needs. Results were extrapolated to determine the effect of a deciduous forest and shelterbelt.

2. Forest vegetation effects on home energy consumption, 7/76 to 6/77. Further mobile home experiments to determine the effect of deciduous grove and pine forest on energy needs for home heating and cooling.

3. Problem analysis for energy conservation using urban forests, 6/77 to 12/77.

Two other ongoing projects are:

4. Generalization and optimization of vegetation effects on energy consumption for residential space conditioning. Analysis of mobile home data from earlier projects to determine optimum year-round vegetation arrangements and effects of varying home characteristics.

5. Placement of coniferous tree shelterbelts to reduce air filtration and energy consumption for space heating in a small mobile home. Field study with a white pine windbreak to determine optimum position upwind from home for energy savings.

Citations of publications produced from this study:

Jacobs, R. E. and D. R. DeWalle. 1977. Effects of forest vegetation on energy consumption for trailer heating. Final Rep., USDA For. Serv., Pinchot Inst., PL 85-934, 61 p.

DeWalle, D. R. and R. E. Jacobs. 1977. Trees around properties cut home heating costs. Pa. State Univ., Coll. Agric., Sci. Agric. 24(4).

DeWalle, D. R. and R. L. Cowan. 1978. Effects of coniferous and deciduous forest vegetation on energy consumption for trailer heati and cooling. Final Rep., USDA For. Serv., Pinchot Inst., Grant no. 23-765, 51 p.

1.23 Tree Value/1.31 Recreation

FARBER, Marion (Bethune, James)
University of Connecticut
Storrs, Connecticut 06268

Sponsored by: McIntire-Stennis, University of Connecticut Experiment Station

Starting and completion dates: 1980-1981

Program adapted for portable computer terminal to provide economic impact information to local planners.

EVALUATION OF ACCIDENT HAZARD ASSOCIATED WITH TREES (1.23/2.23)

PAINE, Lee A.
Pacific Southwest Forest and Range Experiment Station
Biology and Control of Diseases Research Work Unit
Berkeley, California 94701

Sponsored by: PSW Station, Urban Forestry Research

Starting and completion dates: Work in progress--1980

Both urban and nonurban land managers and owners find that injuries, fatalities, and losses from hazardous tree accidents are unacceptably high. Because of the seemingly random occurrence of such accidents, no adequate guidelines were ever made available for the evaluation and reduction of hazards to available levels without unnecessary destruction of needed trees. The function of this study is to develop research information and procedures for economical control of hazards. This is particularly important since accidents have been increasing in proportion to the rising use of sites, and dollar costs per accident are increasing even more rapidly.

Data are being collected nationally from all types of sites subject to tree accidents. With new computer programs, the data can be analyzed with respect to tree species, class of failure, tree diameter, associated defects, environmental conditions, type of site, losses, and other factors.

RECREATIONAL IMPACTS ON FOREST COMMUNITIES OF HIGH SCIENTIFIC, EDUCATIONAL AND NATIONAL-HISTORIC VALUE IN THE CHICAGO METROPOLITAN AREA (1.31)

1.31 Recreation

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Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: September 1, 1980

1. Assess recreational disturbances in selected unique forest sites in the Chicago metropolitan area.

2. Develop effective management guidelines to ameliorate such disturbances.

EVALUATING VISITOR'S EXPERIENCES AT AN OUTDOOR HISTORICAL MUSEUM (1.31

HAYWARD, Geoffry and JONES, C. Dalton
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Sponsored by: Subcontract from the Old Sturbridge Village's grant from the National Endowment for the Humanities (NEH)

Starting and completion dates: January 1978-July 1978

This study supported work by Old Sturbridge Village (OSV) in preparing for the development of a new interpretive program for their outdoor museum of a 'living' 19th Century New England Village. The resear developed a framework for investigating how the visitors to OSV perceiv and experience the village. The principal question addressed was, How is the visitor's experience of OSV inhibited or facilitated in terms of these key issues: (a) getting a sense of going back in time, (b) perceiving the museum as a community rather than a series of indoor/outdoo exhibits, (c) gaining specific information about artifacts or typical activities of the era portrayed by OSV, and (d) developing a sense of the relationship between OSV and the visitor's everyday life and environment.

Citations of publications produced from this project:

1.31 Recreation

Hayward, D. G., C. D. Jones, L. Birebaum, M. L. Miller, and J. F. Palmer. 1978. Investigating the nature of visitor experiences at Old Sturbridge Village. TEI Report No. R-78/12. Environ. Inst., Univ. Mass.

PRIVATELY OWNED FOREST RESOURCES--THEIR ROLE IN MEETING PUBLIC RECREATIONAL NEEDS (1.31)

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Michigan State University
Department of Park and Recreation Resources
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Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: September 1, 1980

1. Identify public recreational needs that can be met on privately owned lands.

2. Assess landowner willingness to produce more recreational opportunities on their lands.

3. Identify and assess public programs whose purpose would be to serve the interests of both urban recreationists and landowners.

PERCEPTIONS OF A NATIONAL SCENIC TRAIL (1.31)

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Sponsored by: National Park Service, American Conservation Association and the USDA Forest Service

Starting and completion dates: September 1977 to September 1978

The objectives of this research were: (1) to develop a procedure for inventorying significant scenic, natural, and cultural qualities of

a National Scenic Trail, (2) to identify a classification which describes how hikers conceptually organize trail environments, and (3) to determine the qualities hikers use to characterize different trail environments, and (4) to demonstrate ways in which knowledge of hikers' perceptions can be useful to trail managers and planners. Hikers were found to perceive seven types of trail environments: (1) rural towns, (2) countrysides, (3) vistas, (4) backwoods, (5) trailside features, (6) pathways, and (7) logging activity. This classification was developed using a comprehensive set of data provided by ten respondents and tested for reliability using 61 additional respondents. Four principal components were extracted from responses using 24 rating scales to describe a representative sample of trail environments: (1) experiential quality, (2) cultural pattern, (3) extraordinariness, and (4) topographic qualities. Very highly significant differences are perceived among the seven trail types over all four of these perceived themes. While more variation occurs among the perceived experiential qualities, a discriminant analysis suggests that trail types are best characterized by their perceived physical qualities. The data and results of this research are used to relate geographically these perceptions to the trail's resource potential. Particular attention is paid to the potential role which developed environments can play along National Scenic Trails.

Citations of publications produced from this project:

Palmer, J. F. 1979. Perceptual research as a recreation management tool: classifying and describing National scenic trail Environments. Univ. Mass. Unpublished dissertation.

Palmer, J. F. 1979. The conceptual typing of trail environments: tool for recreation research and management. In Assessment of aesthetic research. T. Daniel and E. H. Zube (eds.), USDA For Serv., Rocky Mt. For. Range Exp. Stn.

THE ROLE OF FOREST ECONOMICS IN URBAN RECREATION: BEHAVIORAL ANALYSIS (1.31)

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Program in Urban and Regional Planning
The Technological Institute
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Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

1.31 Recreation/1.32 Wildlife

Completion date: March 1980

1. Develop and test hypotheses about the process by which people choose to (or not to) engage in urban recreation activity, with particular emphasis on forest related resources.

2. Develop and test a behavioral model of demand for forest recreation based on an explanation of the recreation choice process.

3. Evaluate the significance of trees, shrubs, etc., in enhancing attractiveness and usefulness of recreation sites.

4. Estimate the value of forest resources in the context of urban recreation, and improve methods for such estimation.

5. Develop methods for evaluating the suitability of potential sites for various recreation activities.

6. Develop and apply methods for assessing the adequacy of available forest related recreation resources in urban areas.

7. Develop and apply design and site location and develop criteria.

USER CHARACTERISTICS AND PREFERENCES FOR URBAN NATURAL AREAS (1.31)

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Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: September 1, 1980

1. Determine recreation behavior patterns as related to site characteristics of urban natural areas.

2. Determine the characteristics, values, and management preferences of the users of urban natural areas.

THE OCCURRENCE, RELATIVE ABUNDANCE, AND HABITAT AFFINITY OF MAMMALS IN SYRACUSE, NY (1.32)

1.33 Aesthetics

VAN DRUFF, Larry W.
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8848

Sponsored by: The Consortium for Environmental Forestry Studies

Starting and completion dates: 1979-1979

The objectives of the study are to inventory the diversity of mammals found in the city, examine their relative abundance, and determine the relationship between the observed diversity and abundance and selected abiotic, biotic, and cultural features of a metropolitan area. Gross cultural features are being measured on a neighborhood basis, while site-intensive vegetative and mammalian assessments are done at one or two selected natural areas in the neighborhoods. The study includes live trapping, vegetative analysis, aerial photo-interpretation, and summarizing U.S. Census Bureau and City agency data.

THE IMMEDIATE NATURAL ENVIRONMENT AND WELL-BEING (1.33/1.34)

KAPLAN, Rachel and KAPLAN, Stephen
University of Michigan
School of Natural Resources
Ann Arbor, Michigan 48109

(313) 764-0426

Sponsored by: USDA, Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: September 1, 1981

1. Identify categories for classifying natural elements that are meaningful in terms of human perception processes.

2. Develop instruments to measure preferences for urban natural configurations.

3. Determine effect of natural settings on psychological well-being.

4. Identify patterns of preferred natural vegetation.

5. Compare psychological benefits received from urban recreation.

OBSERVATIONS OF SOCIAL AND PSYCHOLOGICAL BENEFITS OF URBAN GARDENING (1.33)

LEWIS, Charles A., Horticulturist
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The Morton Arboretum
Lisle, Illinois 60532

(Editor's note: The following are excerpts from Mr. Lewis's reply; the title above was supplied by the editor.)

We have strong anecdotal evidence of social and psychological benefits of urban gardening. Recent work by Professors Rachel and Stephen Kaplan, psychologists at the University of Michigan, points to deep seated satisfactions gained from the experience of vegetation. We recognize that these person/plant relationships are not only beneficial but indeed therapeutic, but lack hard data to support this view. I strongly recommend a research project that would study the kinds of benefits and satisfactions that are found in the experience of vegetation in urban settings. The disciplines of psychology and sociology will be able to identify and quantify these benefits. (1.33)

People/Plant Publications by Charles Lewis:

Lewis, Charles. 1979. Can you grow flowers on Avenue D? New York Times, March 28.

Lewis, Charles. 1972. Public housing gardens--landscapes for the soul. In Landscape for living, U.S. Dep. Agric. Yearb. Agric. p. 277-282.

Lewis, Charles. 1973. People-plant interaction: a new horticultural perspective. Am. Hortic. 52(2):18-25.

Lewis, Charles. 1976. People-plant interaction: a man-environment relationship. The Univ. Wash. Arbor. Bull. 39(1):2-9.

Lewis, Charles. 1976. People-plant proxemics: a concept for humane design. In The behavioral basis of design book I selected papers/ EDRA 7. Dowden, Hutchison & Ross, Stroudsburg, PA p. 102-107.

Lewis, Charles. 1977. Human perspectives in horticulture. In Children, nature, and the urban environment, symp. proc. USDA For. Serv. Gen. Tech. Rep. NE-30:187-190.

Lewis, Charles. 1978. A holistic view of horticulture. The Avant Gard. 10(18):

Lewis, Charles. 1980. Urban gardens, landscapes for the soul. First Natl. Urban For. Conf. Proc. 1978, Wash., D.C.

SOCIAL ATTITUDES TOWARD TREES/FORESTS BY VARIOUS USER GROUPS (1.34)

KIELBASO, James
Michigan State University
Department of Forestry
East Lansing, Michigan 48824

(517) 355-0090

Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: September 1980

Identify as many attitudes towards trees/forests as possible in hopes of finding those of greatest significance to urban forestry. Comparisons of various parameters will be made to determine if there are differences within the population that merit special attention to different management schemes.

AN INVESTIGATION OF THE IMPACT OF URBAN RESOURCES, EVALUATIONS, AND BEHAVIORS ON THE QUALITY OF URBAN LIFE (1.34)

MARANS, Robert W.
The University of Michigan
Survey Research Center
Institute for Social Research
Ann Arbor, Michigan 48106

(313) 764-8389

Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: September 1, 1979

1. Compare social well-being among urban areas with different levels of urban forest resources.

2. Compare social well-being among urban areas with different environmental conditions.

3. Expand knowledge of basic human needs, stress levels, perceptions, and other human behavior in relation to urban forests and environments.

4. Measure the benefits (sociopsychological needs and satisfactions) urban people derive from alternative states of the urban environment.

ASSESSMENT OF SOCIAL BENEFITS OF TREES IN CITIES (1.34)

MULLIGAN, Edward
Department of Psychology
University of Georgia
Athens, Georgia 30602

(404) 542-4983

Sponsored by: USDA Forest Service

Starting and completion dates: January 1, 1979 to December 31, 1979

Purpose is to conduct a series of preliminary or pilot exploratory studies to determine the kinds of social benefits produced by urban trees and the extent to which urban trees affect choice in housing, recreation, and municipal budgeting.

INFLUENCE OF VEGETATION ON MAN'S RESPONSE TO NOISE (1.34/1.12)

MULLIGAN, Edward
Department of Psychology
University of Georgia
Athens, Georgia 30602

(404) 542-4983

Sponsored by: USDA Forest Service

Starting and completion dates: November 30, 1978 to December 31, 1979

Determine whether a person's response to noise--including aesthetic response, performance of communicative and physical tasks, and audition --is modified by characteristics of the environment, especially in the tested areas.

ENVIRONMENTAL INFLUENCE OF SEX EXPRESSION IN ACER GRANDIDENTATUM (2.11)

BARKER, Philip A.
USDA Forest Service
Intermountain Forest and Range Experiment Station
Logan, Utah 84321

Starting and completion dates: 1978, completed

Tree improvement for amenity purposes.

RESEARCH PROGRAM: NORTHERN GREAT PLAINS RESEARCH LABORATORY (2.11/2.12/2.23/2.32/2.4)

CUNNINGHAM, Richard A.
Research Geneticist
USDA, Science and Education Administration
Agricultural Research
North Central Region
Northern Great Plains Research Laboratory
Highway 6 South
P.O. Box 459
Mandan, North Dakota 58554

(Editor's note: The research program is summarized in the following excerpt from Mr. Cunningham's reply. Each of the major research projects is described below under separate titles. The title above was supplied by the editor.)

The tree research at our laboratories is primarily directed at solving problems associated with trees growing in field shelterbelts and farmstead windbreaks. However, the results of our research are often applied to urban tree problems and windbreaks.

Genetic improvement of trees and shrubs for the Northern Great Plains

Research objectives:

a. Tree and shrub cultivars genetically improved for hardiness, pest and herbicide tolerance, faster growth rate, better crown form, and reduced crop competition.

b. Efficient techniques for propagating, establishing, and managing genetically improved trees and shrubs in seed orchards and clonal stool beds.

2.11 Breeding

Priority species:

a. Elms--Siberian, Japanese, slippery

b. Poplar--cottonwood, hybrid poplars

c. Bur oak

d. Junipers--Rocky Mtn., eastern redcedar

e. Pines--lodgepole, ponderosa

f. Hackberry and honey locust

Current research programs:

a. Establishment of a broad-based gene pool of Ulmus (elm) genotypes and establishment in a breeding arboretum.

b. Assemble a diverse gene pool of Populus clones into clonal archives.

(2.11/2.12)

Disease resistant trees and shrubs for shelterbelts in the Northern Great Plains

The overall objectives involve: (1) identification of the causal agent's pathogens involved in the diseases of windbreak species; (2) development of selection criteria for disease resistance; (3) provision of information on management systems that will enhance disease control; and (4) contribution to the development of superior cultivars for future plantings. (2.32)

Water relations and physiological stress effects on growth and development of windbreak trees

Research emphasis will be on the effects of water deficits and air temperature on tree growth and development, and the effects of stress factors on tree susceptibility to diseases and phenoxy herbicides. Also, water requirements, rooting patterns, and the level of competition of species planted in windbreaks needs to be determined to provide for better selection of species for specific soils, growing conditions, and cropping systems. (2.23/2.4)

2.11 Breeding

RESEARCH PROGRAM: SHADE TREE LABORATORIES, UNIVERSITY OF MASSACHUSETTS
(2.11/2.23/2.32/2.4)

HOLMES, Francis W.
Director of Shade Tree Laboratories
College of Food and Natural Resources
University of Massachusetts
Amherst, Massachusetts 01002

(413) 545-2402

(Editor's note: Following are excerpts from Mr. Holmes's reply. The above title was supplied by the editor)

Allelopathy study:

We are beginning a controlled study of allelopathy (toxic effects of trees of one species upon trees of another species, usually through chemical exudates), now especially well known from walnuts and sugar maple. (2.4)

Dutch elm disease research:

Elm bark beetle attraction and trapping with pheromones.

Dr. G. N. Lanier, SUNY College of Environmental Science and Forestry, used our Dutch elm disease data--collected in Massachusetts, town-by-town for many years--in this project. The project included analysis of Dr. Lanier's research results on disease control--conducted at Phillips Academy, Andover, Massachusetts--within the context of losses over the years to Dutch elm disease in the town of Andover and Massachusetts as a whole.

Disease transfer.

Arrangements were made (in cooperation with the Town of Amherst) to try to transfer the Dutch elm disease fungus from a bark-beetle infested log of an elm that had died several months earlier, to each of approximately 300 young elms (1" to 3" dbh) in the Hadley research nursery. (2.32)

Disease control research.

Of eight large elms injected with benomyl phosphate in June and July, 1975, on the University of Massachusetts campus (as soon as natural infections were found), six have now died, and two survived the 1975-76-77 seasons without any wilt. By now the treatment may be con-

sidered to have worn off. Last minute note: In the 1978 season, foliage on both of these remaining trees wilted. (2.32)

To compare the injection methods of Knodo (through ends of severed roots) with that of the Elm Research Institute (through holes drilled into the base of the trunk), arrangements were made to inject elm trees to see whether distribution of the trunk differs. (2.32)

Comparison of aggressive capabilities of fungus cultures.

Our 'Groeneveld' and 'Crommelin' nursery elms, planted in the fall of 1976, suffered winter injury in the winter of 1977-1978; however, all but two of the trees remain alive. In this plantation we had expected to be able to distinguish between lower and higher aggressive capability of cultures of the Dutch elm disease fungus, but the trees are insufficiently established to give reliable results as yet. (2.32)

Resistant species breeding.

Only one resistant tree formed seeds this year, but others are expected to form seed next year. Earlier crosses (NY-R18-2) have not shown any inheritability of resistance. Seeds were grown in the greenhouse nevertheless. (2.11)

Verticillium wilt disease research:

A study of Verticillium wilt disease tolerance of stressed maples was started by innoculating selected trees of sugar, silver, red, and Norway maple. Some of these trees were suffering already from artificially induced drought, or smothering by the plastic equivalent of pavement, or fill, or cut roots, in respective plots. They were put in contrast with three groups of control maples: (1) with Verticillium but no stress, (2) with stress but no Verticillium, and (3) with neither stress nor Verticillium. The first season no symptoms of maple wilt were detected, so the trees are scheduled for reinnoculation with newly isolated cultures of the fungus Verticillium sp. (2.32)

A proposal for a grant to continue earlier studies of comparative levels of salt plus Verticillium, for tolerance and susceptibility in maples planted in a parking lot, is being rewritten for the new Pathology Section of the Consortium for Environmental Forestry Studies (2.32). We are in the initial stages of studying electrical resistance of the transpiration stream of ring-porous trees like elm and oak, also maples, to see if findings will help to control wilt diseases. (2.4)

2.11 Breeding

Painting of trees:

We still have seen no harm to the 10-year-old silver and sugar maples whose trunks we painted several years ago with white latex house paint as a possible equivalent of whitewash. (Oil-based house paints are known to kill trees.) The effect is not likely to wear off quickly through weathering after the need for cooling (after transplanting) no longer exists. However, we have an oral report of tree injury in a comparative experiment in Michigan. (2.23)

Comparison continues of the single painting of wounds, versus no painting, versus painting renewed every 3 months, versus painting renewed every 3 months with benomyl added to wound paint. It is too early (4 years) for these trees to be sacrificed to see the eventual extent of wood decay invasion. (2.23)

Girdling injury:

Thirteen years of artificial girdling (by bolting angle irons) have not yet caused visible injury to foliage and twigs in sugar, silver, red, and Norway maples in our Hadley shade tree research nursery, although the bases of the trunks are greatly distorted on the parallel, constricted sides. A few trees are now so large that they will soon be wholly girdled and die. This result has not been published. (2.32)

Production of Ailanthus altissima seedlings for research use:

Seeds of Ailanthus altissima (Tree-of-Heaven) were stratified in sand under refrigeration with and without fungicide treatment. Others were planted directly in greenhouse flats with and without fungicide treatment, and others were planted directly in the nursery in field soil, with and without fungicide treatment. Stratification proved needless because all seed lots gave abundant seedlings. These trees will serve for many future experiments to determine the usefulness of Tree-of-Heaven in certain locations. (2.11)

Publications from Shade Tree Laboratories (Amherst):

Holmes, F. W. 1978. Annual report--Dutch elm disease. Univ. Mass. Shade Tree Labs., 3 p.

Holmes, F. W. 1978. Massachusetts tree warden town histories . Univ. Mass. Shade Tree Labs. Mass. Tree Wardens' & For. Assoc. Bark 6 (1):6.

Holmes, F. W. 1978. Summary of conference Mass. For. and Park Assoc. 32nd Annu. Conf. on Dutch Elm Disease Proc. 32:13-15.

2.11 Breeding

Holmes, F. W. 1978. Shade trees--the friends of the poor and the city-dweller. The Dawes Arbor. Newsl. 11(2):6 Neward, Ohio.

Holmes, F. W. 1978. Canker diseases of trees and shrubs. J. Arboric. 4(2):47-48.

Holmes, F. W. 1978. Tree wardens battered, bloodied, but unbowed by blizzard of '78--meet during the "Storm of the Century". Mass. Tree Wardens' & For. Assoc. Bark.

Holmes, F. W. 1978. Social and economic consequences of the Extension Service--shade tree program. 4 p. Coop. Ext.

Holmes, F. W. 1978. Nontransmission of Ceratocystis ulmi from Dutch elm diseased to healthy American elms by chainsaw. Am. Phytopathol. Soc. Proc. 1977. Vol. 4. 85 p.

Holmes, F. W. and T. A. Tattar. 1978. Tree disease research in Massachusetts. Submitted to 19th Northeastern Forest Pathology Workshop. 1.

Holmes, F. W. 1978. Review of: "The comparative effectiveness of pruning versus pruning plus injection of trunk and/or limb for therapy of Dutch elm disease in American elms", by G. F. Gregory and J. R. Allison, 13 p.

Holmes, F. W. 1978. Before you buy a tree-shaded home...Mass. Coop. Ext. Serv. Publ. 2 p.

Holmes, F. W. 1978. Street tree inventories. Report to Mr. C. S Hood, Chief of Mass. Bur. Insect Pest Control. Boston. 3 p.

Holmes, F. W. 1978. How to choose an arborist (tree expert). Univ. Mass. Shade Tree Lab. 2 p. rev.

SOME RESEARCH TOPICS: CARY ARBORETUM (2.11/2.12/2.32)

KARNOSKY, Dr. David F.
Forest Geneticist
Cary Arboretum
Box AB
Millbrook, New York 12545

(Editor's note: Dr. Karnosky has sent the titles of the following research topics. The above title was supplied by the editor.)

2.11 Breeding

1. Improving air pollution tolerance of urban trees. (2.11)

2. Progeny testing air pollution tolerance in Acer and Fraxinus. (2.12)

3. Developing disease resistant elms. (2.11)

4. Studying the London plane tree-decline problem in New York City. (2.32)

5. Cytogenetics of trees. (2.11)

Citations from publications produced from this project:

1. Karnosky, D. F. 1978. Testing the air pollution tolerances of shade tree cultivars. J. Arboric. 4(5):107-110.

2. Karnosky, D. F., and Daniel B. Houston. 1979. Genetics of air pollution tolerance of trees in northeastern United States. In 26th Northeast. For. Tree Improve. Conf. Proc. 1979:161-178.

3. Karnosky, D. F. Selection and testing programs for developing air pollution tolerant trees for urban areas. IUFRO Air Pollution Meeting. 1978. Ljubljana, Yugoslavia. (In press)

4. Karnosky, D. F. 1978. The plight of New York's stately elms. NAHO 11(2):2-5

5. Karnosky, D. F. 1977. A simple, rapid giemsa staining technique for routine study of tree chromosomes. Can. J. For. Res. 7:435-440.

6. Karnosky, D. F. 1977. Evidence for genetic control of response to sulfur dioxide and ozone in Populus tremuloides. Can. J. For. Res. 7:437-440

BREEDING AND TESTS PITCH AND LOBLOLLY PINE HYBRIDS (AND MASS PRODUCING DESIRABLE ONES) (2.11)

LITTLE, Silas
USDA Forest Service
Northeastern Forest Experiment Station
The Pennsylvania State University
University Park, Pennsylvania 16802

2.11 Breeding

a. An orchard of 32 pitch pine clones from Virginia, West Virginia north to upstate New York and Maine, and 33 loblolly clones from Maryland and Delaware was established in New Lisbon, New Jersey mostly in 1964.

b. Controlled crosses between some of the individual clones were made in 1974-78 (also through pollen from other clones that were shipped in).

c. Test plantings (29) were made in 9 states in 1971-77--11 to 103 hybrid stock, plus check stocks in a planting.

d. Certain hybrids have very good growth and form, being 50 to 100% taller than certain check stocks 3 to 5 years after planting, and so far some hybrids have proved winter-hardy in all plantings (Saratoga County, New York, Merrimack County, New Hampshire).

e. Because of climatic effects, different hybrids are best in different areas.

f. Because of demands for stock for mass plantings (1) pollen has been applied with a mistblower (without bagger), and University of New Hampshire is estimating through isoenzyme studies the hybrid proportion of resulting seeds; (2) states of Maryland and New Jersey are starting F, orchards for wind pollination and for determining the value of resulting offspring.

REESTABLISHING NATIVE VEGETATION IN OVERUSED RECREATIONAL AREAS (2.11)

LITTLE, Silas
USDA Forest Service
Northeastern Forest Experiment Station
The Pennsylvania State University
University Park, Pennsylvania 16802

Starting and completion dates: 1978-1979

Treatments tried in two blocks in each of four Maryland park areas were digging, mulching and fencing, plus planting wild shrubs, wild herbaceous plants, and barrier plants such as catbrier.

LONG TERM (ABOUT 40 YEARS) CHANGES IN STAND COMPOSITION IN THE NEW JERSEY PINE BARRENS FROM PRESCRIBED BURNING (2.11)

2.11 Breeding

LITTLE, Silas
USDA Forest Service
Northeastern Forest Experiment Station
The Pennsylvania State University
University Park, Pennsylvania 16802

Starting and completion dates: 1978-1979

Changes as a result of 0 to 15 prescribed burns, seed-tree cuttings and wildlife in the resulting sapling stands of 2 study areas (one of thirty-two 2.5-acre plots; one of twenty-eight 0.5-acre plots).

EVALUATION OF PLANTS FOR GROWTH, PERFORMANCE, AND LANDSCAPE CHARACTERISTICS (2.11/2.12)

MOWER, Robert G.
Cornell University
Ithaca, New York 14853

Sponsored by: Hatch Project 141414

Evaluate variants of woody plants to determine their suitability for landscape planting under New York State conditions.

Determine the kinds of trees best suited for use along streets and highways by observing growth and performance characteristics.

CYTOGENETICS, BREEDING, AND EVALUATION OF LANDSCAPE TREES (2.11/2.12/2.4)

SANTAMOUR, Frank
U.S. National Arboretum
Washington, D. C. 20002

(202) 399-5400

Sponsored by: U.S. Department of Agriculture

Starting and completion dates: July 31, 1967 to termination

Our work at the U.S. National Arboretum is really not a research project but a dedicated and continuing program of research to develop better trees for urban planting. Pest resistance has been especially important in the past.

New proposed research will deal with the genetics and physiology of woundsand graft incompatibility in landscape trees.

2.11 Breeding

Citations of publications produced from this project:

(Editor's note: 1977-78 publications only are included here.)

Santamour, Frank S., Jr. 1977. Flavonoid distribution in Gleditsia. J. Arboric. 3:14-18.

Santamour, Frank S., Jr. and Frederick G. Meyer. 1977. Clarifying monarch birch's origins and characteristics. Am. Nurseryman 145(12):7, 88-94.

Santamour, Frank S., Jr. 1977. The selection and breeding of pest-resistant landscape trees. J. Arboric. 3:146-152.

Santamour, Frank S., Jr. 1977. Breeding better urban trees--Problems, practices, and potential. South. For. Tree Improv. Conf. Proc. 14:2-12.

Santamour, Frank S., Jr. and Duane F. Zinkel. 1977. Resin acids, resin crystallization, and weeviling in Balkan x eastern white pine hybrids. Northeast. For. Tree Improv. Conf. Proc. 25:164-175.

Santamour, Frank S., Jr. 1977. Dutch elm disease control--1977: A symposium summary. In The Current State of the Art of Dutch Elm Disease Control, F. S. Santamour, Jr. and Robert Felix (Eds.) Natl. Arborist Assoc. Symp. No. 1, p. 108-118.

Santamour, Frank S., Jr. 1978. Where are the sweet honeylocusts today? Am. Assoc. Bot. Gard. Arbor. Bull. 12(1):24-28.

Santamour, Frank S., Jr. 1978. Seed orchards provide seed for uniform widely adaptable seedlings. Am. Nurseryman 147(8):13, 67-71.

Demuth, Polly and Frank S. Santamour, Jr. 1978. Carotenoid flower pigments in Liriodendron and Magnolia. Bull. Torrey Bot. Club 105: 65-66.

Santamour, Frank S., Jr. 1978. Susceptibility of honeylocust (Gleditsia) species to mimosa webworm. Metrop. Tree Improv. Alliance (METRIA) Proc. 1:49-56.

Santamour, Frank S., Jr. 1978. Interspecific hybridization in Carpinus. Metrop. Tree Improv. Alliance (METRIA) Proc. 1:73-79.

Santamour, Frank S., Jr. 1978. Carotenoid flower pigments in Rhododendron. HortScience 13:461-462.

PROVENANCE TESTING--GENE SOURCE FOR URBAN TREE IMPROVEMENT (2.11/2.12)

STEINER, Kim C.
The Pennsylvania State University
University Park, Pennsylvania 16802

Sponsored by: The Consortium for Environmental Forestry Studies

Completion date: June 1979

Provenance and progeny collections for green ash, sweetgum, and pin oak have been assembled for the purpose of studying genetic variation in traits important for the survival of trees in densely populated areas.

USE OF AILANTHUS ALTISSIMA AS A LOW-MAINTENANCE SPECIES FOR POOR URBAN PLANTING SITES (2.12/2.21)

ANDERSON, Linda M. (USFS) and MIXON, John (Georgia Forestry Commission)
Forestry Sciences Laboratory
Carlton Street
Athens, Georgia 30602

(404) 546-2451

Sponsored by: USDA Forest Service

Starting and completion dates: November 1, 1978--November 1, 1980

Determination of growth and survival potential of Ailanthus altissima ("tree of heaven") on low quality urban sites, and determination of aesthetic contribution of this species relative to other possible species choices (for example, sumacs, princess tree) suitable for the same locations.

BENEFITS OF MYCORRHIZAL INNOCULATION AND SATURATION PLANTING OF TREES IN POOR URBAN PLANTING SITES (2.12)

CORDELL, H. K. (USFS) and MIXON, John (Georgia Forestry Commission)
Forestry Sciences Laboratory
Carlton Street
Athens, Georgia 30602

(404) 546-2451

Sponsored by: USDA Forest Service and Georgia Forestry Commission

2.12 Selection

Starting and completion dates: November 1, 1978--December 31, 1980

Determination of growth and survival rates of selected oak and pine species in adverse urban situations under varying conditions of planting density, mycorrhizal innoculation, and sludge fertilization. Trees will be monitored periodically to detect the extent and severity of vandalism damage.

SELECTION OF PLANT MATERIALS FOR URBAN CONDITIONS (2.12)

HILLIARD, Edmund
559 Buckingham Avenue
Syracuse, New York 13210

(315) 472-4979

Sponsored by: City of Syracuse, Parks and Recreation Department

Starting and completion dates: 1977-1980

Research centered around various conditions that plant materials must tolerate in the city, and best plant materials to tolerate those conditions. End result should provide information for urban ecosystem planning in Syracuse. Emphasis is on communities of plants as used in the urban forest, as opposed to a limited focus on street trees.

GUIDE FOR RECOMMENDED ORNAMENTAL URBAN TREES IN ARIZONA (2.12)

MACBETH, David R.
1624 W. Adams
4th Floor
Phoenix, Arizona 85007

(602) 255-4633

Sponsored by: Forestry Division, Arizona State Land Department

Starting and completion dates: September 1978--February 1979

Research to identify exotic and native trees capable of growing and surviving in the diverse urban environments throughout Arizona. Information on about 100 species including physical, leaf, flower, fruit characteristics for identification; pruning, fertilization, watering requirements; insects and disease susceptibility; faults and remarks.

PRELIMINARY WORK IN SOMATIC CELL HYBRIDIZATION OF AMERICAN ELM (2.12/2.11)

REDENBAUGH, M. K. (WESTFALL, R. D., SUNY CESF: KARNOSKY, D. F., Cary Arboretum)
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

Sponsored by: U.S. Park Service and the Rockefeller Institute (submitted for funding)

Completion date: 1980

Sexual, interspecific hybridization between American elm and other elm species has not been successful. This has prevented the incorporation of the Siberian and the Chinese elm's Dutch elm disease resistance with the American elm's aesthetic qualities. Plant tissue culture methods involving another culture, protoplast production, and somatic cell hybridization are proposed as techniques to overcome the crossability barriers between American elm and other elm species.

GENETIC "FINGERPRINTING" IN URBAN TREE VARIETIES (2.12/2.4)

SPRY, T. (WESTFALL, R. D.)
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

Sponsored by: The Consortium for Environmental Forestry Studies

Completion date: 1979

All breeding procedures have been developed to enable tree breeders to select and propagate genetically improved varieties. Choice of proper breeding methods depends primarily on the extent and distribution of genetic and environmental variability for desired traits in the population being used for selection. But in working with urban tree populations, breeders are faced with diverse environments, ancestries of unknown origin, and artificial population structures. The traditional method used to determine genetic differences among individual trees under difficult conditions has been to plant representatives of those trees, either as cuttings or as seedlings, in common environments. However, space and time requirements for such tests can be substantial. Thus, procedures which enable breeders to make genetic distinctions among standing urban trees would be desirable.

Proteins, being one step removed from the genetic code, can be used as a tool in making such genetic distinctions. This technique has

been used to study natural populations of tree species. Thus, there is no reason that the technique could not be applied to the task of identifying cultivars and families in urban trees.

It is the objective of this study to develop analytic procedures needed to define genetic differences in selected populations of urban sugar and Norway maple families. Such procedures will be useful as aids in breeding tree varieties which are well-adapted to urban environments, a goal of the Pinchot Consortium.

EARLY TESTING FOR INSECT AND DISEASE RESISTANCE IN URBAN TREES (2.12/2.31/2.32)

VALENTINE, F. A.
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8812

Sponsored by: The Consortium for Environmental Forestry Studies

Starting and completion dates: May 1, 1978-April 30, 1980

Field, nursery, and greenhouse tests are being used to characterize the variability in resistance to Verticillium alboatrum and Empousca pobal, the potato leafhopper, in the urban tree population of Norway and sugar maple. Relationships among maternal half-siblings will be used to estimate the heritability of Verticillium resistance in these populations, and techniques for test resistance to the potato leafhopper are being developed.

ESTABLISHMENT OF URBAN TREE PROGENY TEST POPULATIONS--A BASE FOR BREEDING NORWAY AND SUGAR MAPLE (2.12/2.11)

VALENTINE, F. A.
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8812

Sponsored by: The Consortium for Environmental Forestry Studies

Starting and completion dates: May 1977-April 1979

Maternal half-sibling families have been established from open-pollinated seed collected from random samples of Norway and sugar maple

street trees in Rochester and Syracuse, New York, and from selected "superior" trees solicited from cities in the Northeast. Germination, growth rates, and survival are being monitored for the first 2 years in the nursery beds. Greenhouse studies have been conducted to develop innoculating procedures for Verticillium alboatrum and criteria for quantitative assessment of rate and extent of disease development in young seedlings.

DESCRIPTIONS AND ANALYSES OF BRANCHING HABITS OF SELECTED SHADE TREES SPECIES AND CULTIVARS (2.12)

VRECENAK, Arthur (MOWER, Robert G.)
Cornell University
Ithaca, New York 14853

Precision is lacking in most descriptions of branching characteristics of shade trees. Because proper selection may depend on branching features, studies are underway to determine the feasibility and possible approach to adding precision in describing this aspect of plant growth. Efforts are being made to categorize branching at various levels of development in order to provide a better basis for utilizing branching characteristics in the plant selection process.

URBAN FORESTRY RESEARCH (2.12/2.13/2.23/3.11)

WAGAR, J. Alan
USDA Forest Service
Pacific Southwest Forest and Range Experiment Station
Berkeley, California

As of October 1, 1977, the Urban Forestry Research Project was formally established and will address four problems: (1) knowledge for selecting, establishing, and maintaining trees and shrubs to achieve specific environmental goals in semi-arid urban environments is inadequate; (2) available principles and procedures are inadequate for planning and designing urban forests and for protecting these areas, as well as people and their structures and related resources; (3) no existing system provides fast, efficient, and economical gathering, analysis, storage, and distribution of technical urban forestry information (this problem was inactive during 1979); and (4) knowledge of people's attitudes toward urban forests is inadequate, as are methods for gaining and utilizing public involvement in establishing and caring for urban forests, and methods for using urban forests to increase people's environmental understanding.

WINTER PROTECTION OF CONTAINER-GROWN ORNAMENTAL PLANTS (2.13/2.23)

STEPONKUS, Peter L. and GOOD, George L.
Cornell University
Ithaca, New York 14853

Sponsored by: Cornell University Agricultural Experiment Station

Completion date: 1980

Experiments are proposed to (1) characterize the thermal environments in overwintering structures, (2) determine the influence of the shoot and its environmental root hardiness, (3) determine if the root regeneration potential is a factor limiting plant survival, (4) assess factors contributing to winter dessication of broad leaved evergreens in overwintering structures, and (5) utilize tissue culture for selection of hardiness at the cellular level.

MANAGEMENT OF LANDSCAPE MAINTENANCE (2.23)

HARRIS, Richard W., and MILLS, Allan
Environmental Horticulture
University of California
Davis, California 95616

(916) 752-0130

Sponsored by: Hatch Act--California Agriculture Experiment Station

Starting and completion dates: January 1977 to June 1981

Twenty-five California city, county, and state agencies that have modified policies in the management of landscape maintenance were studied to learn approaches being used and the results. Common management procedures included:

1. involvement of employees in developing programs;
2. inventorying of resources to be maintained;
3. listing and describing how tasks are to be done;
4. determining time standards for tasks described;
5. setting of frequencies with which tasks are to be done;
6. scheduling tasks in order to use personnel and equipment to advantage;

7. implementing programs; and

8. monitoring work and schedules and adjusting as needed.

All steps were involved in every management undertaking--either through design or default. The most important steps to increase productivity are involving employees and scheduling their work.

Citations of publications produced from this project:

Harris, Richard W. 1977. A management approach to tree maintenance. J. Arboric. 3(6):101-107.

Harris, Richard W. 1977. A management approach to park maintenance. Parks and Recreation 12(12):32-34.

TRUNK DEVELOPMENT OF LANDSCAPE TREES (2.23)

HARRIS, Richard W. and LEISER, Andrew T.
Environmental Horticulture
University of California
Davis, California 95626

(916) 752-0130

Sponsored by: California Agriculture Experiment Station

Starting and completion dates: January 1973-December 1979

A young tree alone, with its top free to move, usually becomes a strong tree better able to withstand the elements. In comparison to a rigidly staked tree an unstaked tree will have these characteristics:

1. Greater caliper at the trunk's base.

2. Less growth in height.

3. Greater trunk taper.

4. Less wind resistance when compared trees are of equal height because the top is free to bend.

5. Subject to less stress per unit of trunk cross-sectional area at the support point.

6. More uniform xylem tissue (wood) for supporting itself upright.

7. No rubbing or girdling injuries.

8. A larger root system.

Citations of publications produced from this project:

Harris, R. W., and W. D. Hamilton. 1969. Staking and pruning young Myoporum laetum trees. J. Am. Soc. Hortic. Sci. 94:359-361.

Harris, R. W., W. D. Hamilton, W. B. Davis, and A. T. Leiser. 1978. Pruning landscape trees. U.S. Agric. Ext. Leafl. 2574.

Leiser, A. T., R. W. Harris, D. Long, W. Stice, R. Maire, and P. L. Neel. 1972. Influence of staking and pruning on container-grown nursery trees. J. Am. Soc. Hortic. Sci.

Leiser, A. T., and J. D. Kemper. 1968. A theoretical analysis of a critical height of staking landscape trees. Am. Soc. Hortic. Sci. Proc. 92:713-720.

Leiser, A. T., and J. D. Kemper. 1972. Analysis of stress distribution in the sapling tree trunk. J. Am. Soc. Hortic. Sci.

Neel, P. L. 1967. Factors influencing trunk development of landscape trees. Int. Shade Tree Conf. Proc. 43:293-303.

MONMOUTH COUNTY SHADE TREE COMMISSION 1978 SUPERINTENDENT'S ANNUAL REPORT (2.23/2.31/2.32/3.4/3.41)

SHAW, David C.
Superintendent
Shade Tree Commission
Holmdel Arboretum
Hall of Records Annex
20 Court Street
Freehold, New Jersey 07728

(201) 431-7910

(Editor's note: The following are excerpts from the report.) The above title was supplied by the editor.)

We have systematically expanded our field operation that includes: the gypsy moth program, roadside shade tree plantings, landscaping of county vocational schools and other buildings, continued progress in the Holmdel arboretum, our seashore test garden areas, our shade tree and shrub nursery, continuing municipal shade tree care and maintenance, and tree care on county roads and right of ways.

2.23 Care and Maintenance

Tree injection test program

This was the eighth full year that we have been working on the experimental gypsy moth tree injection program with the Guardian Tree Expert Company from Maryland and Dr. Louis Vasary of Rutgers University. The chemicals used were Meta-Systox R and Bidrin, and the controls were excellent. There seems to be a little problem of the wounds not healing properly on some of the trees, but most trees healed well. This experimental program will be continued for 2 more years. (2.31)

Street tree survey

This year we studied our street tree survey of all county roads. The gypsy moth survey team gathered all the information needed. This has never been done in Monmouth County before, and the information is long overdue. This survey gives us permanent data on types of trees, size, condition, etc. Eventually we want to give a monetary value to our shade tree investment and do a cost analysis per tree on county roads. We want to know what types of trees are growing within our jurisdiction, percentages of each, and the total number. Our pilot is responsible for the crew doing the street-tree survey and keeping it up to date. (3.4/3.41)

Tree problems--Monmouth County

These past several years, Don Mohr, our county agricultural agent, and Mr. Shaw made a study of many tree problems in Monmouth County and have found that the biggest factor of dying trees is girdling roots. Extensive research throughout the years determined that trees planted 10 to 15 years ago were planted too deep and, in some instances, with twisted roots. These roots seem to grow back and around the trunk of the tree and cut off the sap flow up the tree.

Container-grown stock seems to have the same effect and presented the same problems of girdling roots as the trees became older. More inspections and data will be taken in 1979. Because of two severe winters, many dogwoods suffered from winter damage and twig blight. Even more twig damage will probably become evident in 1979. (2.23/2.32)

FOLIAR NUTRITION OF ECONOMIC PLANTS (2.23)

TUKEY, H. B., Jr.
Cornell University
Ithaca, New York 14853

Sponsored by: Horticultural Research Institute of American Association of Nurserymen

2.25 Soils/2.3 Protection/2.31 Insects

Starting and completion dates: 1978-82

Study the use of foliar nutrition: (1) to meet the nutritional needs of economic plants, (2) to reduce nutrient runoff and ground water pollution, and (3) to provide nutrients to plants in both agricultural and nonagricultural situations.

WOOD CHIP MULCHING FOR URBAN TREE PLANTING (2.25/2.23)

HAM, Donald and DUNN, B. Allen
College of Forest and Recreation resources
Clemson University
Clemson, South Carolina 29631

(803) 656-2478

Sponsored by: USDA Forest Service

Starting and completion dates: September 1, 1978-August 31. 1980

Evaluate the effectiveness and costs of wood chip mulching for improving the structure, composition, fertility, and microorganism content of urban soils for tree growth.

STRESS DETECTION IN URBAN TREES (2.3)

MANION, P., and others
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

Study remote sensing methodology including microdensitometric and digital scan techniques. Evaluate multivariate correlation of microdensitometric measurements and ratioing of spectral bands with stress symptoms. Evaluate objective and subjective ground assessment techniques. Characterize obligate internal pathogen effects on stress symptoms over time.

AN ANALYSIS OF THE MAJOR INSECT AND DISEASE PROBLEMS OF URBAN FORESTRY IN THE SOUTH (2.31/2.32)

BERISFORD, Yvette and HUNTER, Preston
Entomology Department
University of Georgia
Athens, Georgia 30602

2.31 Insects

(404) 542-7888

Sponsored by: USDA Forest Service

Starting and completion dates: November 1, 1978-July 13, 1978

Identify, describe, and set priorities for the major insect and disease problems relative to current research needs.

For the highest priority studies, develop detailed study plans showing objectives, problem description, expected results, detailed procedures, etc.

Construct a permanent photographic slide reference file of descriptive information on insect and disease problems.

LIFE CYCLE OF THE SMALLER EUROPEAN ELM BARK BEETLE IN GEORGIA (2.31/2.32)

BERISFORD, Wayne
Department of Entomology
Bio-Sciences Bldg.
University of Georgia
Athens, Georgia 30602

(404) 542-7888

Sponsored by: USDA Forest Service

Starting and completion dates: June 1, 1978-May 31, 1980

Determine the number of annual generations of Scolytus multistriatus in Georgia. Determine and compare rates of brood development in the different geographical areas. Determine if S. multistriatus brood development or survival is affected by different elm hosts: American elm (Ulmus americana), winged elm (U. alata), and slippery elm (U. pulva).

INSECTS AFFECTING WALNUT (2.31)

JOHNSON, W. T.
Department of Entomology
Cornell University
Ithaca, New York 14853

(607) 256-4426

2.31 Insects

Sponsored by: State University of New York

Walnuts of several species may be used for shade and home horticulture. Pest control and sometimes the pests are different when encountered under urban conditions. As the opportunity arises, studies are conducted to deal with insects associated with Juglans species. This is an open-ended project.

Citations of publications from this project:

MacDaniels, L. H., W. T. Johnson, and J. E. Braun. 1975. The black walnut bunch disease syndrome. 60th Annu. Rep. North. Nut Growers Assoc. p. 71-87.

MICROBIAL PESTICIDES FOR ORNAMENTAL PLANTS (2.31)

JOHNSON, W. T.
Department of Entomology
Cornell University
Ithaca, New York 14853

(607) 256-4426

Microbial pesticides are highly desirable, especially in urban environments. We expect to utilize bacteria, viruses, and fungi known to be pathogenic to certain insects and apply them with traditional and new technology equipment.

Citations of publications from this project:

Johnson, W. T., J. C. Cunningham, and W. J. Kaupp. 1977. Insect virus application with a cold fog generator. Can. For. Serv. Bi-mon. Res. Notes 34(4):25-26.

CONTROL OF INSECTS AND MITE PESTS OF WOODY ORNAMENTAL PLANTS, SHADE TREES, AND CHRISTMAS TREES (2.31)

JOHNSON, W. T., and ZEPP, D. B.
Department of Entomology
Cornell University
Ithaca, New York 14853

(607) 256-4426

Studies under this project include insect and mite biology, control, and observations relative to plant tolerance and resistance to

insects. Much of this work is utilized in updating the New York State (Cornell) recommendations for the control of insects affecting trees and shrubs.

MICROBIAL PESTICIDES--THEIR PRACTICAL APPLICATION TO CONTROL INSECTS AFFECTING TREES AND SHRUBS (2.31)

JOHNSON, W. T.
Department of Entomology
Cornell University
Ithaca, New York 14853

Sponsored by: Cornell University, College of Agriculture and Life Sciences

Field tests were conducted during the summer of 1977 using Bacillus ingiensis combined with sub-lethal doses of chemical insecticides to control forest tent caterpillar, spruce budworm, and fall webworm. This work was unique because of the method of application, using a Leco ULV Cold Fog Generator. The treatments were highly successful for controlling forest tent caterpillar, Malacosoma disstria.

Also a nuclear polyhedrosis virus distributed through a cold fogger was successful in controlling the red-headed pine sawfly (Neodiprion leocontei). The results were sufficiently encouraging to warrant continued work.

MANAGEMENT OF ELM BARK BEETLES AND DUTCH ELM DISEASE WITH BEHAVIOR-MODIFYING CHEMICALS (2.31/2.4)

LANIER, Gerald, O'CALLAGHAN, Dealga, and GALLAGHER, Ellen
Department of Environmental and Forest Biology
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8751

Sponsored by: Freshwater Biology Foundation, Minneapolis, Minnesota and USDA Forest Service

Starting and completion dates: Ongoing to 1981

Three years of mass-trapping European elm bark beetles on pheromone sticky traps has coincided with decline in Dutch elm disease rates in all test areas. Commercial development of this technique is being pursued.

Pheromone baits are also being used experimentally to lure beetles to diseased elms that have been killed by injection with an herbicide. The 1st year (1978) of research with this technique showed that in-flight beetles attack these trees in large numbers, but brood production is 84-100% reduced. This technique shows potential for producing healthy elms by managing beetle populations and diseased elms at low cost.

Citations of publications produced from this project:

Lanier, G. N., R. M. Silverstein, and J. W. Peacock. 1976. Attractant pheromones of the European elm bark beetle (Scolytus multistriatus): Isolation, identification, synthesis and utilization studies. In: Perspectives in forest entomology. J. E. Anderson and H. K. Kaya, eds., Academic Press, NY, pp. 149-175.

Lanier, G. N. 1978. Behavior-modifying chemicals as a basis for managing bark beetles of urban importance. In Perspectives in urban entomology. G. Frankie and C. Koehler, eds., Academic Press, NY, pp. 295-310.

BIOLOGY AND CONTROL OF INSECT PESTS OF WOODY ORNAMENTAL AND CHRISTMAS TREES (2.31)

ZEPP, Donald B.
Cornell University
Ithaca, New York 14853

Sponsored by: Cornell University, College of Agriculture and Life Sciences

A flexible program designed to investigate life cycles and all available control techniques for insect and mite pests of woody ornamentals and Christmas trees. Current major activity involves root-feeding weevils and sessiid borers in lilac and dogwood. Insecticide screenings are performed as required to meet the nursery and Christmas tree industry's need.

ACTIVITY OF SYSTEMIC FUNGICIDES ON THE SYCAMORE CANKER STAIN FUNGUS (2.32)

McCRACKEN, F. I.
Southern Forest Experiment Station
P.O. Box 227
Stoneville, Mississippi 38776

(601) 686-7218

2.32 Disease/2.35 Damage from Development

Sponsored by: USDA Forest Service

Completion date: June 1979

Seven systemic fungicides were tested for their potential control of Ceratocystis fimbriata f. platani. Of the materials tested, Lignasin and Arboteck show the greatest activity on the fungus.

Citation of publication produced from this project:

Van, S. R. and F. I. McCracken. 1979. Activity of systemic fungicides on the sycamore canker stain fungus. J. Miss. Acad. Sci. (Suppl.) p. 10.

THE CAUSE OF DIEBACK OF SOUTHERN MAGNOLIA (2.32)

McCRACKEN, F. I.
Southern Forest Experiment Station
P.O. Box 227
Stoneville, Mississippi 38776

(601) 686-7218

Sponsored by: USDA Forest Service

Starting and completion dates: 1978-1980

Pathogenicity of magnolia fungus associated with dieback and mortality are being determined.

THE EFFECTS OF SOIL COMPACTION AND TREE ROOT EXCISION ON TREE VIGOR AND GROWTH (2.35)

MADER, Donald and WEEKS, David
Department of Forestry and Wildlife Management
University of Massachusetts
Amherst, Massachusetts 01003

(413) 545-2758

Sponsored by: Consortium for Environmental Forestry Studies

Starting and completion dates: April 29, 1977-October 29, 1979

Information is lacking on the effects of different kinds of site development practices on the health, survival, and vigor of trees in

housing developments in wooded areas. The survival and continued vigor of residual trees is of great importance for their aesthetic, microclimate, and other amenity values, to avoid the large cost of removal and replacement, and to avoid the long-term period of waiting for maturity of replacemnt trees.

The objectives of the proposed research are to examine in controlled field tests the impacts on trees in housing developments, of soil disturbance, girdling, and root removal, and to determine their effects on survival, vigor, and growth. Relocated single tree plots will be used to test levels and combinations of soil disturbance, girdling, and root removal in respect to the survival, vigor rating, diameter growth, and height growth of oak and/or white pine. These studies should complement other studies regarding the survival and growth of urban trees as influenced by genetics and air pollution.

THE PHYSIOLOGICAL IMPACT OF FUMIGATING CONIFERS WITH OZONE AND SULFUR DIOXIDE (2.36)

LASSOIE, JAMES P.
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Cornell University
Ithaca, New York 14853

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Sponsored by: McIntire-Stennis Project 147556

Starting and completion dates: October 1, 1977-September 30, 1980

This study will quantify the physiological effects of ozone and sulfur dioxide on selected conifer species common to New York State. This study is unique since it will simultaneously examine: (1) tree species, (2) physiological activity, (3) concentrations of pollutants below those known to induce visible foliar injury, and (4) pollutants in combination with each other. Pollutant thresholds will be established for each species based on observed reduction in foliar gas exchange rates.

Physiological response to various pollutant fumigations will be assessed from continuous measurements of new assimilation and transpiration rates of seedlings. Gas exchange measurements will be taken using a curvett/gas analysis/environmental control system made available by the Boyce Thompson Institute, Cornell University. Stomatal response will also be examined. Various concentrations of sulfur dioxide and ozone will be used separately and in combination with one another. Optimal light, temperature, and water conditions will be used during the fumigations.

2.36 Pollution/2.4 Physiology

Citations of publications from this project:

Richberger, W. E. and J. P. Lassoie. 1978. Air pollution: Trees can help. Wyo. Cty. Farm and Home News. 64(7):12. (Plus 15 other county Cooperative Extension publications).

Lassoie, J. P. 1978. Urban forestry: The challenge ahead. Greene Cty. Farm and Home News 61(11):14 (Plus 6 other county Cooperative Extension publications).

RESISTANCE OF PIN OAK TO IRON CHLOROSIS (2.36/2.12)

STEINER, Kim C.
The Pennsylvania State University
University Park, Pennsylvania 16802

Sponsored by: The Consortium for Environmental Forestry Studies

Completion date: March 1980

Various strains of the fungus will be grown in combination with different families of pin oak to determine the effects on the growth of the host plant.

EVAPOTRANSPIRATION OF URBAN TREES (2.4)

MILLER, David R.
University of Connecticut
Storrs, Connecticut 06268

Starting and completion dates: 1978-1979

The objective of this proposed research is to study the water use characteristics of mature urban trees by monitoring transpiration (ET) rates in various urban environments. Short term ET rates will be determined from extensive field measurements of sap flux by the Heat Pulse Velocity (HPV) method. Measurements will be made throughout the growing season on trees in a number of urban sites. The sites will be characterized by soil moisture availability and atmospheric moisture demand. The sap flux measurements will be calibrated against diffusion porometer and lysimetric measurements being taken by Pinchot cooperators in Syracuse, New York.

2.4 Physiology/3.11 Technology Transfer

THE STUDY OF THE SOIL-PLANT-ATMOSPHERE CONTINUUM IN URBAN TREES (2.4/1.11)

POTTS, Donald F. and HERRINGTON, L. P.
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8642

Sponsored by: The Consortium for Environmental Forestry Studies

Completion date: 1978

The study topic is the soil-plant-atmosphere water continuum of urban honey locust (Gleditsia triacanthos). Trees form an important part of the urban surface and, therefore, play an important role in the determination of urban climate. The primary objective is to obtain information on transpiration from urban trees, which will then allow some evaluation of the evaporative heat-sink information critical to development of meso-scale climatic models.

Lysimetry and detailed observation of meteorological and physiological phenomena are used to test the validity of both simple energy budget evaluations of transpiration and a unique crown model approach which is being developed by Dr. John Norman at the Pennsylvania State University.

STUDY OF CLIENT GROUP, KNOWLEDGE DIFFUSION AND DECISION PROCESSES IN URBAN FORESTRY PLANNING AND MANAGEMENT (3.11)

KOTEN, Donald E., and ROWNTREE, Rowan A.
SUNY College of Environmental Science and Forestry
5 Moon Library
Syracuse, New York 13210

(315) 473-8673

Sponsored by: Pinchot Institute for Conservation Studies, USFS Northeastern Forest Experiment Station, Syracuse, New York

Starting and completion dates: October 1, 1979--September 30, 1980

Over the past several years several conferences have been designed to transfer urban forestry knowledge to practicing professionals and operating managers. While these vehicles of technology transfer have been generally successful for the client groups for which they were designed, they have not had much impact at higher managerial levels in

municipal and regional management and planning. One reason for this is that little is known about who makes many of the decisions which affect the urban forest and its management, how these decisions are reached, or what information (and in what form) is desired, or needed, by these decision makers. The purpose of this study is to answer these questions.

Specific objectives include the following: (1) Identify and characterize selected upper management and planning client groups and individuals that have, or can have, an impact on urban forestry research and application; (2) Identify the knowledge diffusion and adoption roles, pathways and processes characteristic of such groups; (3) Develop a limited number of information packages (for example, manuals, background papers, slide-tape programs, monographs) pertinent to the needs of these client groups and evaluate the effectiveness of a sample presentation.

URBANBASE (3.12/3.11)

MAGILL, Arthur W.
USDA Forest Service
Pacific Southwest Forest and Range Experiment Station
Berkeley, California 94701

Starting and completion dates: 1979-1980

Evaluate the feasibility of an interactive computer search and retrieval service, which will contain digests of various types of "gray literature" and scientific and technical publications, processed in plain language, for the use of urban foresters, arborists, extension specialists, horticulturalists, landscape architects, and park managers. The purpose is to provide the practitioners a ready source of the most current information needed to solve the problems that they face while managing parks, greenbelts, and other urban forests.

TRANSLATION AND TRANSFER OF INFORMATION FOR USE IN PLANNING AND MANAGEMENT OF MUNICIPALLY-OWNED URBAN FOREST RESOURCES (3.12/3.34/3.31)

RICHARDS, Norman and STEVENS, Jack
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8673

Sponsored by: USDA Forest Service, Northeastern Forest Experiment Station, Urban Forest Research, Syracuse, New York

Starting and completion dates: October 1978--September 1979

Using the city of Syracuse, New York as a case study area, research will include: (1) further analysis of streetside space and tree resource data from a previous study, with particular attention to its interrelationships with other available information; (2) further examination of the present street-tree management and tree replacement process in Syracuse as it reflects agency objectives and constraints and public values and inputs, in order to identify needs for improved information; (3) development of planning and operational processes for incorporating appropriate resource information into the process of interaction between cities and citizens, and (4) comparison of results with other street-tree management programs of other cities.

INTERPRETING THE URBAN ENVIRONMENT (3.13)

MONTCRIEF, Lewis and STYNES, Daniel J.
Michigan State University
Department of Park and Recreation Resources
East Lansing, Michigan 48824

(517) 355-0823

Sponsored by: USDA Forest Service, North Central Forest Experiment Station, Chicago, Illinois

Completion date: April 1, 1980

1. Review the state of the art of interpretive research and assess its relevance and applicability to urban environmental themes and urban audiences.

2. Complete a detailed inventory of existing interpretive facilities in southeastern states.

3. Select one or more areas and conduct a detailed comprehensive evaluation of interpretive programs and facilities in terms of their applicability to the needs of urban society.

URBAN FOREST DEVELOPMENT (3.32)

MCBRIDE, Joe R. and JACOBS, D.
Department of Forestry
University of California
Berkeley, California 94720

(415) 642-2482

Sponsored by: McIntire-Stennis Cooperative Forestry Research Program

Starting and completion dates: 1975-1979

This project seeks to understand the transition from wildland forest to urban forest in the western United States. Where cities have developed, variables of wildland forests are believed to influence the character of the urban forest and fate of relict trees following development. Cities in contrasting forest types are being studied; wildland forest species composition, tree density, size distribution, crown cover, and age structure are measured and compared with the same variables in the developed urban forests.

Citations of publications produced from this project:

McBride, J. and D. Jacobs. 1976. Urban forest development: a case study, Menlo Park, California. Urban Ecol. 2(1):1-4.

McBride, J. and D. Jacobs. 1979. Urban forest structure: a key to urban forest planning. Calif. Agric. 36(5):24-25.

MINIMUM-MAINTENANCE VEGETATION SYSTEMS FOR EXTENSIVE-USE URBAN PARKLANDS (3.32)

RICHARDS, Norman A.
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8656

Since 1974, ecologically sophisticated but low-labor techniques of vegetation management have been initiated in selected low-use, high productivity city parks in Syracuse, New York. The techniques are monitored for their ecological (biotic) and social implications.

DEVELOPING A NATURAL RESOURCE INVENTORY PROCEDURE FOR AN URBAN-EDGE TOWN: POMPEY, NEW YORK (3.32/3.34)

RICHARDS, N. A. and TESSIER, J. D.
SUNY College of Environmental Science and Forestry
Syracuse, New York 13210

(315) 473-8656

3.32 Land-Use Planning

Starting and completion dates: 1978-1979

Develops and evaluates methodology for use by a Town Environmental Commission (Pompey, NY) for inventorying forest and farmland resources. The methodology is applicable to an urban-edge town, and gives special attention to distinguishing between cover conditions, resource uses, and resource values.

URBAN LAND-USE CHANGE: PLANNING OPTIONS FOR URBAN FORESTRY MANAGEMENT (3.32)

SANDERS, Ralph A. and ROWNTREE, Rowan A.
Maxwell School
Syracuse University
Syracuse, New York 13210

(315) 473-8673

Sponsored by: USDA Forest Service, Northeastern Forest Experiment Station, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210

Starting and completion dates: October 15, 1978-May 15, 1979

1. Evaluate existing research on urban land-use change and the effects of urban land use on the distribution and function of the urban forest.

2. Evaluate the distribution of, and demand for, selected land uses in older American cities. A first stage objective will focus on the creation of vacant land in the urban residential core. Particular attention will be given to cities having a large quantity of vacant land or a significant number of obsolete or near-obsolete structures, or cities having a significant proportion of their housing constructed before 1945. This objective deals with, but is not limited to, the identification of sites for possible urban afforestation.

3. Construct a model of recent and future urban land-use change that incorporates the economic, social, and political variables necessary to understand this phenomenon. This includes the consideration of urban land values, demand for various categories of land uses and locations, the demand for certain residential locations, property taxes, public intervention in the land market, and the increasing cost of energy as it affects the distribution of land uses through its effects on transportation and the economic viability of existing buildings.

CONCEPTS AND METHODS OF FOREST RESOURCE PLANNING AND MANAGEMENT AT THE METROPOLITAN FRINGE (3.32/3.34)

STRONG, Ann Louise, COUGHLIN, Robert E. and ROWNTREE, Rowan A.

Department of City and Regional Planning
University of Pennsylvania
Philadelphia, PA 19101

(215) 243-8329

Sponsored by: The USDA Forest Service, Northeastern Forest Experiment Station, SUNY College of Environmental Science and Forestry, Syracuse, New York 13210

Starting and completion dates: January 1979-December 1979

The first phase of this multidisciplinary study is designed to develop the appropriate concepts and methods for mid- and long-term management of the forest and vegetation resources in suburbanizing counties. The second phase (June 1980-June 1981) will test these concepts and methods through the application of a management plan for a portion of the Brandywine Valley near Philadelphia, Pennsylvania. First phase work is divided into the following tasks: (1) developing concepts and methods for defining, measuring, and evaluating the forest and vegetation resource; (2) simulating future population and economic changes in the Philadelphia-Wilmington metropolitan region through the year 2000; (3) translating these changes into planning variables at the county scale; and (4) developing alternative forest and vegetation management strategies in the context of probable future land-use patterns (county scale). These management strategies incorporate an understanding of the distribution of benefits and costs over time and among public and private sectors. Management objectives include: surface and ground water quality and quantity, air quality, microclimate, acoustics, wildlife, aesthetics and recreation, and timber utilization.

MANAGEMENT AND PLANTING OF TREES IN URBAN SITUATIONS (3.34)

PERRY, Thomas
North Carolina Agricultural Experiment Station
North Carolina State University
Raleigh, North Carolina 27067

(919) 737-2891

Sponsored by: USDA Forest Service, Athens, GA

3.32 Land-Use Planning

Starting and completion dates: September 1, 1978-August 31, 1980

Describe successful and unsuccessful urban tree programs in U.S. cities. Include organization, content, legal setting, establishment, and maintenance in the southern states. Also, arrange for long-term, cooperative study with permanent plots in municipal areas, as desired by municipal and state foresters.

Rowntree, Rowan A., and Judith L. Wolfe, compilers.
1980. Abstracts of urban forestry research in progress--1979. Northeast. For. Exp. Stn., Broomall, Pa.
72 p. (USDA For. Serv. Gen. Tech. Rep. NE-60)

Summary of research in progress on urban forestry. Abstracts inform researchers of ongoing work and help urban forest managers anticipate results of interest to them.

273(048.1)

Keywords: urban forestry

Headquarters of the Northeastern Forest Experiment Station are in Broomall, Pa. Field laboratories and research units are maintained at:

- Amherst, Massachusetts, in cooperation with the University of Massachusetts.
- Beltsville, Maryland.
- Berea, Kentucky, in cooperation with Berea College.
- Burlington, Vermont, in cooperation with the University of Vermont.
- Delaware, Ohio.
- Durham, New Hampshire, in cooperation with the University of New Hampshire.
- Hamden, Connecticut, in cooperation with Yale University.
- Kingston, Pennsylvania.
- Morgantown, West Virginia, in cooperation with West Virginia University, Morgantown.
- Orono, Maine, in cooperation with the University of Maine, Orono.
- Parsons, West Virginia.
- Princeton, West Virginia.
- Syracuse, New York, in cooperation with the State University of New York College of Environmental Sciences and Forestry at Syracuse University, Syracuse.
- University Park, Pennsylvania, in cooperation with the Pennsylvania State University.
- Warren, Pennsylvania.