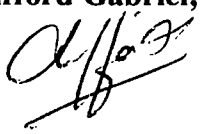
April 21, 1993

David:

The USDA Forest Service research office sent this material to me to pass on to you. They appear to be making all the right noises and generally have led the way in developing the concept of ecosystem management.

What's happening with the post-Forest Conference executive committee? has it met? I'll be on travel from Monday afternoon through Friday of next week, but I would appreciate an update after I get back to the office.

Clifford Gabriel, X1460



Clinton Presidential Records
Digital Records Marker

This is not a presidential record. This is used as an administrative marker by the William J. Clinton Presidential Library Staff.

This marker identifies the place of a publication.

Publications have not been scanned in their entirety for the purpose of digitization. To see the full publication please search online or visit the Clinton Presidential Library's Research Room.

Conserving Our Heritage
America's Biodiversity

United States Department of Agriculture
Forest Service

Forest Service Research

SOUND SCIENCE FOR SOUND POLICY

Forest Service Research has world class capabilities and the institutional infrastructure to address the nation's and the globe's most pressing natural resource problems. Founded essentially as a conservation and restoration organization, our work has evolved with the country's changing environmental values. Today we are conducting research in many of the areas that require urgent policy and management action:

- *Sustainable Development*
- *Biodiversity*
- *Green Technology*
- *Economic and Social Values*
- *Global Change*
- *Ecological Management*
- *Forest Health*

FORESTS, THE ENVIRONMENT, AND THE ECONOMY

Forests are critical to the global environment and the global economy. They are a source of food, shelter, and income for millions. They provide sanctuary for people and habitat for wildlife. Forests filter and protect our water supply and absorb carbon dioxide from the atmosphere. In many ways, they are the foundation of a healthy environment and a healthy economy.

FOREST SERVICE RESEARCH -- A CRITICAL MASS OF EXPERTISE

Since its establishment as the Division of Forestry in 1876, Forest Service Research has been the world's single largest source of natural resource information. Currently, over 700 scientists provide information and technology to assure the productivity, health, and diversity of the Earth's forest ecosystems. Their span of expertise includes temperate, boreal, and tropical forests; social systems; and environmentally sound or "green" technology.

Forest Service Research scientists' work is uniquely grounded in environmental realities because of their access to 190 million acres of National Forest land, 84 Experimental Forests, and more than 270 Research Natural Areas. Laboratories in every region of the country assure results that reflect the rich variety of the nation's ecosystems. Research is also international in scope -- our scientists are presently working with colleagues in over 20 countries.

Made from recycled office waste

Manufactured at USDA Forest Service, Forest Products Laboratory, Madison, WI.

Recycled Paper

HARMONIZING THE ENVIRONMENT AND THE ECONOMY

Forest Service Research can be a key player in efforts to improve the economy and the environment. With economists and social scientists, ecologists and foresters, we understand both the environmental and economic importance of forest ecosystems. We also have extensive experience in organizing and coordinating partners -- science agencies, universities, nongovernmental organizations, managers, policy makers, educators, and industries -- for work that transcends the abilities of any single organization and produces solutions that serve the needs of both people and forests.

FOREST SERVICE RESEARCH PROGRAMS -- A FEW EXAMPLES

From aesthetics to zoology, Forest Service Research (FSR) has scientists, equipment, facilities, and protocols to cover the full spectrum of today's complex forest resource issues.

Sustainable Development was the goal of our work in Micronesia, where one of our scientists helped to design and plan a reserve system for mangrove forests. Mangrove forests occur on and near the shorelines of islands, where most people and roads are concentrated. The land, therefore, is sought for development and the forests are heavily exploited for timber and game. The plan for mangrove reserves -- developed in consultation with residents and local authorities -- includes preservation, production, and park areas.

Although it is easy to understand the importance of **Biodiversity**, the methods for recognizing and sustaining it are much less obvious. Forest Service researchers have developed a set of recommendations for maintaining and enhancing biological diversity that helps managers concentrate on the elements of diversity that are most at risk. As a result, national forests have been able to restore landscape elements that had become rare, consider the biodiversity of adjacent non-federal lands in forest planning, and identify old growth forests for preservation.

Forest Service Research is a leader in developing environmentally sensitive or **"green" technology**. With four patents awarded in FY 1991 and eight expected in FY 1992, technologies coming out of FSR include recycling, nonpolluting paper production, energy efficient wood product manufacturing, and use of wood products as a renewable alternative to fossil fuels. These technologies balance optimal forest resource use with ecosystem needs to provide benefits in jobs, the environment, and U.S. competitiveness.

Made from recycled diapers

Manufactured at USDA Forest Service, Forest Products Laboratory, Madison, WI.

Recycled Paper

While forest ecosystems have an inherent value, they will not be preserved if their **economic and social values** are not understood and appreciated. Our scientists, working with colleagues from the Department of Energy, have shown that windbreaks can be valuable in urban settings as well as rural areas. The scientists developed a computer program that estimates home energy use with 40-foot-tall windbreaks on the north and west sides of houses. A reduction of 19 percent in home heating costs was estimated for the northernmost city in the study -- Minot, North Dakota. Existing trees around houses in the United States save an estimated $2 billion in energy costs each year. Good tree management could increase those savings markedly.

The Forest Service **Global Change** Research Program is studying how forest ecosystems will affect and be affected by alterations in the global environment. Although there is uncertainty about the precise amount of carbon stored in forests, they are a critical component in the greenhouse gas balance of the Earth. Thus, forests may be a powerful tool for reducing and adapting to global change. One of our scientists has identified management strategies for increasing the carbon stored in forest ecosystems and estimated those increases for a number of major U.S. regions and forest types.

Ecological approaches to forest and grassland management are a primary focus of Forest Service Research. FSR researchers, in partnership with the Utah Division of Wildlife Resources, the Idaho Fish and Game Department, and the Bureau of Land Management compiled information to help restore biological diversity and improve range condition on over 100 million acres of grassland in the interior West. A technical report outlined ways to return fire frequency to its historic cycle of 30 to 72 years, thus permitting native grasses to replace invading cheatgrass to the benefit of livestock and wildlife.

Assuring **forest health** is an historically important function of Forest Service Research. In the Blue Mountains of northeast Oregon and southeast Washington, FSR is working with citizen groups, environmental organizations, industry, and universities to restore health to stressed ecosystems and communities. FSR established the Blue Mountains Natural Resources Institute in 1992 to address such issues as sustainability of managed ecosystems, effects of land management practices, education, and economic development. Although the Institute is in its early stages, it has already brought together hundreds of people to tackle some of the regions most difficult environmental challenges.

Made from recycled fast food containers

Manufactured at USDA Forest Service, Forest Products Laboratory, Madison, WI.

Recycled Paper

USDA FOREST SERVICE RESEARCH
LINKAGES BETWEEN AGENCY MANDATES AND ENVIRONMENTAL BIOLOGY RESEARCH ISSUES

Since its creation in 1905, the Forest Service has been entrusted with management of the National Forest System. The need for research was recognized early in the development of the Forest Service and resulted in the creation of the Forest Service Research Program in 1915. With passage of the Multiple Use Sustained Yield Act in 1960, the Forest and Rangeland Renewable Resources Planning Act in 1974, the National Forest Management Act in 1976, and the Forest and Rangeland Renewable Resources Research Act in 1978, the Forest Service's role was further refined to balance demands that were often in conflict: demands for forest products, and demands to protect other resource values. The long-term renewable resources situation in the United States, detailed in the 1989 Resources Planning Act Assessment, projects a widening gap between future demand for many natural resources and the projected availability of those resources. Only by prudent use of science as a foundation can the agency make the best policy decisions.

Over the past 5 years, Forest Service Research has defined its role for the future as providing the scientific basis for the formulation of sound policies that balance societal needs with environmental concerns. To accomplish this, Forest Service Research works with partners -- science agencies, universities, and private and public organizations -- who are dedicated to serving people's needs. It also works for and with users -- policy makers, natural resource managers, educators, and industries and other producers -- who represent people and their needs.

Two complementary national strategic plans provide guidance for research--the Secretary of Agriculture's 1990 Resources Planning Act Program and the Forest Service's Strategy for the 90's for USDA Forest Service Research. The 1990 Resources Planning Act Program calls "sound resource management, technological advances, and new scientific information ... essential to meeting current and future resource needs." The Strategy for the 90's reinforced this by recognizing that future trends of expanding populations, increasing competition for the use of natural resources, and increasing public concern for the environment calls for "increased information and multidisciplinary approaches to solve natural resource management, use, and policy development problems." At the same time the National Academy of Science's National Research Council released its report "Forestry Research: A Mandate for Change", that concluded "forestry research must ... broaden its scope if societal issues are to be addressed adequately." Taken together, these three reports provide consistent direction for Forest Research programs in 1992 and beyond. Forest Service Research's focus is to develop and communicate broadly-applicable knowledge to solve problems in three interrelated research areas:

- **Understanding the structure and function of forest and range ecosystems.** This includes study of the mechanisms that control ecosystem processes and the interdependency of ecosystem components. Ecosystem research provides the scientific basis for addressing resource health and productivity issues.

- **Understanding how people perceive and value the protection, management, and use of natural resources.** Increased diversification of resource uses and differing perceptions among user groups make finding a consensus on resource protection, management, and use more challenging.

- **Understanding and expanding resource protection and management options.** The focus is on determining which protection and management practices and utilization systems are most suitable for sustainable production and use of natural resources. Special attention will be given to options for water, fish, wildlife, and recreation use and to recycling wood fiber for new products.

12/15/92

USDA FOREST SERVICE RESEARCH
ECOLOGICAL PROCESS AND BIODIVERSITY RESEARCH NEEDS

Forest Service ecological process and biodiversity research is aimed at providing the science base for conserving, protecting, and restoring biological diversity on Federal lands and understanding causal relationships. Historically, research focused primarily on land management practices at the site or local level. This focus has now shifted so that current research efforts are ecosystem oriented on a wide range of issues and at a variety of spatial and temporal scales. This is especially critical as opportunities associated with setting goals and objectives for the management of a particular area are determined not only by the "content" of that area, but also by the landscape "context" in which it resides.

The goals of Forest Service ecological process and biodiversity research are to: (1) improve understanding of issues that affect biodiversity, (2) develop approaches to problem-solving at a variety of scales, and (3) provide guidelines for resource management in terms useful to land managers. Specific research needs include:

- Determining and developing methods and indicators to measure and monitor diversity of plants, animals, ecosystems, and landscapes, so that accomplishments can be gauged and objectives for biodiversity can be quantified.
- Designing methods to restore and rehabilitate degraded forest, rangeland, and associated aquatic habitats and the recovery of threatened and endangered species.
- Diversifying options in managed boreal, temperate, and tropical forests to address both ecological values and sustained forest productivity.
- Understanding ecosystem functions and processes, particularly the cumulative effects of management actions on the ecology and viability of populations and communities.
- Improving our understanding of the ecologic, social, and economic implications of the landscape patterns created by past and present resource management--especially forest fragmentation, edge effects, and linkages among landscape ecosystems.
- Examining the effects of both spatial and temporal aspects of habitat patterns, including fragmentation, on species interactions, community structure, and ecosystem processes.
- Developing management practices that emulate natural disturbances in terms of frequency, severity, and spatial distribution and determining their relationships to biological diversity, ecosystem health, and sustained productivity.
- Determining how physical, chemical, and biological processes are regulated by global change impacts on the environment.
- Understanding the response of species, ecological communities and natural and managed ecosystems to elevated levels of carbon dioxide, climate change, and physical/ chemical stresses.
- Evaluating the sustainability of management systems and land and resource use in temperate and tropical ecosystems, considering social needs and ecosystem limitations.
- Understanding the role of soil and hydrologic processes and how they affect forest and rangeland ecosystems.
- Determining the resistance or vulnerability to intrusion, disruption or invasion by exotic species of forests, rangelands, and associated aquatic ecosystems whether managed or not.
- Learning to control exotic pests by developing methods that do not disrupt the normal structure and function of ecosystems.
- Developing methods to assess and predict the impacts of insects, disease, and environmental stresses on individual trees, stands, and landscape patterns.
- Understanding the role of native insects and diseases as keystone species that regulate the structure and function of forest ecosystems.

FOREST SERVICE RESEARCH IN THE USDA/FORESTRY RESEARCH INITIATIVE

A VISION FOR CHANGE FOR AMERICA

USDA/Forestry Research Initiative. *Managing the Nation's forest resources relies increasingly upon scientific information and technology. This includes areas as diverse as understanding forest ecosystems and the wildland/urban interface, to research on extending the use of wood as a raw material. This investment will allow the Forest Service and other USDA research agencies to increase the breadth and depth to which forestry research areas are investigated, providing the necessary information to help the Nation develop sound forest-related policies that will both provide resources to meet ever-increasing demands from the population and sustain forest ecosystems. The initiative would be funded at $287 million over four years. Estimated outlays: 1994--$16 million; 1994-1997--$261 million.*

	1994	1995	1996	1997	1998
	.....million dollars.....				
Forest Service	10	31	41	51	61
Initiative Total	16	56	84	105	122

KEY POINTS:

- The National Research Council report "Forestry Research: A Mandate for Change" identified five broad research areas that critically need to be strengthened. The implementation team recognized the need to initially focus on ecosystem management research.
- In future years the initiative will broaden the complete depth and breadth of forestry research as outlined in the National Research Council Report and the Legacy for the Future proposal.
- The existing state of knowledge is simply inadequate to develop sound forest-related policies that will both provide resources to meet ever increasing demands for a growing population and sustain ecosystems.

(OVER)

- Ecosystem management integrates ecological, economic, and social factors to meet human needs by maintaining diverse, healthy productive, and sustainable ecosystems. This initiative will provide that focus.

- The scientific basis for ecosystem management requires a combination of (1) basic long-term scientific inquiry; (2) issue-focused, problem solving interdisciplinary research and technology development; (3) scientific support to the ongoing management of lands and resources, such as through ecological classifications, inventories, ecological analyses, and monitoring and evaluation; and (4) integrating science into the policy-making process.

- The initiative will address the following goals:

    - To foster National Forest System/Forest Service Research partnerships.
    - To enhance the integration of research and management planning, implementation, and funding of Ecosystem Management projects, programs, and activities.
    - To encourage the timely transfer of new technology, synthesis of research information, and the application of science to Ecosystem Management.

- Forest Service funding will be allocated by a competitive process that emphasizes station/region partnerships.

- Total USDA funding in FY 1994 is $20 million.

- The initiative will provide for partnerships between the USDA Forest Service ($10 million), Extension Service ($1 million), Cooperative State Research Service ($9 million), the natural resource and forestry academic community, and forest industry.

EXAMPLES OF PROPOSED RESEARCH:

NE/R-9: Human Forest Interaction in the Appalachian Mountains

NC/R-9: Ecological Classification System Development and Evaluation

SE/R-8: Chattooga Basin Ecosystem Management Demonstration Project

SO/R-8: Wetland Hardwood Forest Ecosystem Research and Management Project

RM/R-3/R-4: Northern Arizona forest Ecosystem Management Research Project

INT/R-4/R-8: Interdisciplinary Monitoring and Evaluation Pilot Study

PNW/R-6: Management Alternatives to Provide Sustainable Habitat for Species Associated with Mature and Old-Growth Forests

PNW/R-10: Chugach Interdisciplinary Research and Management Project--Spruce Beetles

PSW/R-5: Developing and Managing Sustainable Forest Ecosystems for Maintenance of Spotted Owls in the Sierra Nevada

FPL/R-8 (IITF): The role of Forest Fungi and Woody Debris on Ecosystem Function in the Caribbean National Forest

FOREST SERVICE RESEARCH
FY 1994 PRESIDENT'S BUDGET

The President's Budget emphasises the Administration's Response to Research Needs:

- The FY 1994 President's Budget reflects the report "A Vision of Change for America" and is unprecedented in its support for Forest Service Research.
- It maintains the FY 1993 appropriation plus includes a small increase for the existing National Problems and the foundation research program.
- It proposes a $10 million increase for the Forest Service part of the USDA/Forestry Research Initiative.

	FY 1991 Final	FY 1992 Final	FY 1993 Enacted	FY 1994 Agency Request	FY 1994 President's Budget
	.....million dollars.....				
National Problems	62.4	69.3	75.2	90.8	75.8
Foundation Research	105.2	111.2	107.5	127.3	108.6
Forestry Research Initiative	0.0	0.0	0.0	0.0	10.0
Total Research Program	167.6	180.5	182.7	218.1	194.4

Forestry Research Initiative:

- The National Research Council report "Forestry Research: A Mandate for Change" identified five broad research areas that critically need to be strengthened. The implementation team recognized the need to initially focus on ecosystem management research.
- Ecosystem management integrates ecological, economic, and social factors to meet human needs by maintaining diverse, healthly productive, and sustainable ecosystems. This initiative will provide that focus.
- The initiative will address the following goals:
  - To foster National Forest System/Forest Service Research partnerships throughout the agency.
  - To enhance the integration of research and management planning, implementation, and funding of Ecosystem Management projects, programs, and activities.
  - To encourage the timely transfer of new technology, synthesis of research information, and the application of science to Ecosystem Management.
- Total USDA funding in FY 1994 is $20 million.
- The initative will provide for partnerships between the USDA Forest Service ($10 million), Extension Service ($1 million), Cooperative State Research Service ($9 million), the natural resource and forestry academic community, and forest industry.

FOREST SERVICE RESEARCH
FY 1994 PRESIDENT'S BUDGET DETAILS

TOPIC: Research Funding Distribution By National Problem, Foundation, and Forestry Research Initiative

ISSUE: FY 1994 President's Budget funding levels for national problems and the foundation program remained constant as compared with the FY 1993 appropriation. Administration priorities focused on the USDA/Forestry Research Initiative.

BUDGET HISTORY:

			FY 1994		
National problem	FY 1992 Final	FY 1993 Enacted	Base	Agency Request	Pres. Budget
	----------million dollars----------				
Wetlands	3.160	3.320	3.390	4.500	3.340
TE&S Species	7.180	8.329	9.100	12.000	8.400
Ecosystem Management	14.270	17.705	18.360	19.950	17.860
Recycling	1.590	2.479	2.575	5.000	2.500
Forest Health Monitoring	1.500	1.933	1.950	5.200	1.940
Tropical Forestry	6.020	6.395	6.590	7.224	6.450
Global Change	23.320	22.110	23.400	23.400	22.260
Enhancing Rural America	12.210	12.939	13.400	13.500	13.040
Subtotal	69.250	75.210	78.139	90.774	75.790
Foundation Program	111.260	107.505	111.838	127.250	108.593
Forestry Research Initiative	0.000	0.000	0.000	0.000	10.000
Total	**180.510**	**182.715**	**190.078**	**218.024**	**194.383**
Budget line item					
Forest Protection	40.771	40.833	42.450	47.111	43.289
Resource Analysis	33.228	34.998	36.286	41.054	36.532
Forest Management	39.216	39.594	41.391	46.656	43.287
Forest Environment	41.655	41.755	43.508	51.858	44.828
Forest Products & Harvesting	25.640	25.535	26.443	31.345	26.447

HIGHLIGHTS OF THE PRESIDENT'S BUDGET:

Maintains congressional intent by continuing research at the FY 1993 appropriation level with the following increases:

- 1% in all National Problems.
- 1% in the Foundation Program.
- $10 million for the Forestry Research Initiative.
- $12 million in total for the Forest Service Research Program.

October 6, 1992

LEGACY FOR THE FUTURE:
An Ecosystem Management Research and Education Initiative

Introduction

Major strides have been made in providing the scientific underpinning for human health. As a result, people all over the world have the potential to live longer, healthier lives. It is now time to pay the same attention to the health of our Nation's and the world's forest resources. Concern about, and interest in, forests and their role has never been greater. But, the existing state of knowledge is simply inadequate to develop sound forest-related policies that will both provide resources to meet ever increasing demands for a growing population and sustain ecosystems.

In a 1990 report entitled "Forestry Research: A Mandate for Change," the National Research Council of the National Academy of Sciences identified the following six issues that exemplify the problem:

- How forests and climate affect each other, especially in the face of rapid global deforestation and forest degradation;
- Loss of biological diversity;
- Growing demand for wood, wood fiber, and derivative chemical products;
- Increasing demand for the preservation of "pristine" forested areas;
- Sustainable wood production integrated with protection of fish, wildlife, water, recreation, and aesthetic values; and
- Maintenance of the health of forests nationally and globally.

The need for a strong, credible and *significant* research and education initiative in natural resources and forestry is underscored by the call for action in several other documents. (See References)

In addition, several pieces of legislation that have recently been enacted, or are presently under debate, require a strong scientific base for decisionmaking. Topics include water quality, wetlands, wilderness, endangered species, biodiversity, global climate change, and old-growth forests.

The National Research Council report argued that an environmental paradigm must be adopted for forestry research and education. The report found that current fund-

ing levels are woefully inadequate. The report identified a research and education agenda and needed program enhancements to meet the agenda.

Specifically, five broad categories of needed research were identified. These are:

- Biology of Forest Organisms. Recent advances in plant biology hold great promise for forestry. To capture this promise, research must be accelerated on such subjects as the physiological and genetic bases of the mechanisms underlying forest health, productivity and adaptability; biotechnology and the forest environment; long-term site productivity; and pest management.

- Ecosystem Function and Management. Responsible environmental management requires a much more thorough understanding of forest ecosystem structure and dynamics, landscape-level ecology, biological diversity, alternative silvicultural systems, and intensive management for wood production.

- Human/Forest Interactions. The needs of people drive the use and misuse of forests. We need to learn much more about the role of forests in urban areas, about recreation and aesthetic values, and about conflict resolution.

- Wood as a Raw Material. Research is needed on technologies for harvesting wood that are environmentally accepted and on the fundamental properties of wood as an essential material.

- International Trade, Competition, and Cooperation. Improvements in international trade, competitiveness, and cooperation in the sustainable production of goods and services from forest resources depend on information. Detailed knowledge about forests worldwide is limited, and information about international trade is sketchy at best.

The National Research Council report found that the demand for scientifically-based information on the status of forests and environmental issues will continue to increase. The report recommended a strengthened extension program as an important technology transfer and education mechanism for forest land owners, natural resource professionals, policymakers, and the public.

The program is described by the National Research Council as ambitious. Fully funded, however, it would serve as a critical and enduring legacy for the people and forests of the future.

The funding levels required over the next five years to fully respond to the recommendations in the National Research Council report are shown in Table 1.

Table 1
Funding Required to Respond to "Forestry Research: A Mandate for Change"
(Millions of Dollars)

	Annual Additional Investment				
Agency or Program	1994	1995	1996	1997	1998
Forest Service Research (1)	18.0	20.0	22.0	24.0	26.0
Cooperative Forestry Research (2)	18.0	24.0	29.0	28.0	28.0
Forestry Competitive Grants (3)	11.0	20.0	20.0	20.0	20.0
Renewable Resources Extension (4)	3.3	4.5	3.0	1.5	0.0
Totals	50.3	68.5	74.0	73.5	74.0

(1) Increase 10 percent per year for five years.
(2) Achieve full authorization level of 50 percent of Forest Service budget in five years.
(3) Achieve $100 million over five years either through National Research Initiative or separate forestry competitive grants.
(4) Achieve authorization level of $15 million annually.

Ecosystem Management Research and Education Initiative -- A First Step

Although the full program recommended by the National Research Council report is critically needed, the realities of current and future budget limitations require that it be implemented in stages. The remainder of this document describes a first step that professionals in government, industry, and universities believe would make an extremely important contribution to the knowledge base required for contemporary resource managers.

Objective

The objective is to develop an initiative that provides accelerated and consistent long-term funding of forestry and natural resource research and education. It is critical that the necessary investments in research and education be made to address

the pressing forestry and natural resource issues and to support current and future resource management programs.

The problems we are facing are as or more complex than any issue previously dealt with by mankind--we will not be able to provide the needed goods, services and values the people require AND sustain our ecosystems if we do not better understand how those systems function, both now and under some desired future condition.

Focus on Ecosystem Management

A focus is needed in order to make this initiative work and to generate the level of support necessary for implementation. Ecosystem management research is the focus for this initiative.

An ecosystem is a community of organisms and its environment that functions as an integrated unit. Ecosystem management integrates ecological, economic, and social factors to meet human needs through diverse, healthy, productive, and sustainable ecosystems. It addresses both resource supply and resource demand sides of these relationships. It focuses on restoring and sustaining natural ecological processes which keep ecosystems healthy and ensure that those ecosystems can continue to carry out the many environmental services which support all life on earth. It encompasses management and resource harvest and utilization technologies to meet people's needs for resources and resource uses. It addresses social values and conservation practices and incentives.

The scientific basis for ecosystem management requires a combination of (1) basic, long-term scientific inquiry; (2) issue-focused, problem solving interdisciplinary research and technology development; (3) scientific support to the ongoing management of lands and resources, such as through ecological classifications, inventories, ecological analyses, and monitoring and evaluation; and (4) integrating science into the policy-making process.

The application of science to ecosystem management calls for a systematic extension process to: (1) provide continuing education for natural resource professionals; (2) enable landowners/managers to adapt and utilize research results; (3) assure basic understanding by public decisionmakers; and (4) reach the general public with education to guide their individual and collective actions.

The research to accomplish these objectives falls into the following categories.

- Ecosystem Management at the Stand or Site Level. Basic studies related to the impacts of resource management and use on the structure, composition, and function of ecosystems.

- Ecosystem Management at the Landscape Level. Research to examine the biological processes, cumulative management effects, and ecosystem responses at the landscape level.

- Dynamics and Mechanisms of Ecosystem Succession following Disturbance. Understanding of natural disturbances and human activities in terms of frequency, severity, and spatial distribution, as factors in ecosystem and resource management.

- Research and Management Methods. Development of new research techniques, statistical procedures, computer applications, and a variety of measurement technologies adapted to an ecosystem perspective.

- Application to Management and Planning. Development of knowledge and technologies for monitoring the impacts of natural succession as well as management on ecosystems at multiple spatial and temporal scales.

- Societal Needs and Economics Considerations. Efforts to improve knowledge of the social, political, and economic impacts of developing and applying ecosystem concepts to resource management.

Ecosystem management is a complex, interdisciplinary process impacting natural resource owners, managers, users, and decisionmakers. Technology transfer is essential to the application of existing and future ecosystem management knowledge. Tailoring educational programs that develop and retain the ecosystem management skill base of these clients is critical if America is to sustain its demand for natural resource goods, services, and values.

Key Elements and Initiatives

- Continues and enhances fundamental or basic research projects at forestry sciences laboratories around the Nation, including Forest Service, universities, forest industry, and other laboratory or center facilities.

- Enhances and expands the research commitment at long-term field research sites, especially long-term ecological reserves and similar watershed systems or forest reserves.

- Enhances and expands interdisciplinary research addressing sociological, biological, and physical factors as whole systems.

- Provides positive incentives for interdisciplinary ecosystem education and research in the Nation's graduate schools.

- Provides for partnerships with the USDA Forest Service, Extension Service, Cooperative State Research Service, the natural resource and forestry academic community, and forest industry.

- Encourages collaborative centers of scientific emphasis that allow scientists to interact and maximize particular strengths.

- Encourages the highest quality science through competitive and collaborative opportunities.

- Provides for systematic extension of research products through education and demonstration for: natural resource professionals; landowners/managers; public decisionmakers; and the general public.

- Allocates new funding and necessary investment in terms of budget, people, and facilities to accomplish the task.

Expected Benefits of the Initiative

- Methodologies to predict responses of ecosystems to management activities and integrated planning and management across stand, site, landscape, and regional levels.

- Better integration of forest production with environmental protection.

- Sustainable ecosystems that provide forest productivity, biological diversity, and a sustainable basis for rural economic development.

- Requisite data, analyses, and understanding for public officials to apply ecosystem science in their decisionmaking and policies.

- High-level competence by natural resource professionals, managers, and landowners on adapting and applying principles and techniques of ecosystem management.

- Increased public awareness on the relationship between people and ecosystems.

- Development of a needed cadre of scientists skilled in conducting interdisciplinary ecosystem research.

Proposal Funding

The funding levels proposed over the next five years are shown in Table 2. The funding shown is additional investments above the expected FY 1993 appropriated funds for each agency or program.

Table 2
Legacy for the Future
An Ecosystem Management Research and Education Initiative
(Millions of Dollars)

	Annual Additional Investment for Ecosystem Management Research				
Agency or Program	1994	1995	1996	1997	1998
Forest Service Research	15.0	15.0	10.0	10.0	10.0
Cooperative Forestry Research	14.0	15.0	12.0	10.0	5.0
Forestry Competitive Grants	7.0	10.0	12.0	7.0	5.0
Renewable Resources Extension	2.2	3.0	2.0	1.0	0.0
Totals	38.2	43.0	36.0	28.0	20.0

REFERENCES

- Sustainable Biosphere Initiative (Ecological Society)
- The Forest Service Program for Forest and Rangeland Resources: A Long-Term Strategic Plan (USDA Forest Service)
- Research Priorities for Conservation Biology (Society for Conservation Biology)
- Safeguarding the Future: Credible Science, Credible Decisions (U.S. Environmental Protection Agency)
- From Genes to Ecosystems: A Research Agenda for Biodiversity (International Union of Biological Sciences)
- Forest Service Research--Strategy for the 90's (USDA Forest Service)
- Global Biodiversity Strategy (World Resources Institute)
- Science and the National Parks (National Research Council)
- Renewable Natural Resource Education--A Report to Congress on the 1991-1995 Renewable Resource Extension Program (USDA Extension Service)
- Reaching the Potential of Private Forests in the United States Through Education (The Extension Service Committee on Organization and Policy's response to the USDA National Forum on Nonindustrial Private Forest Lands)

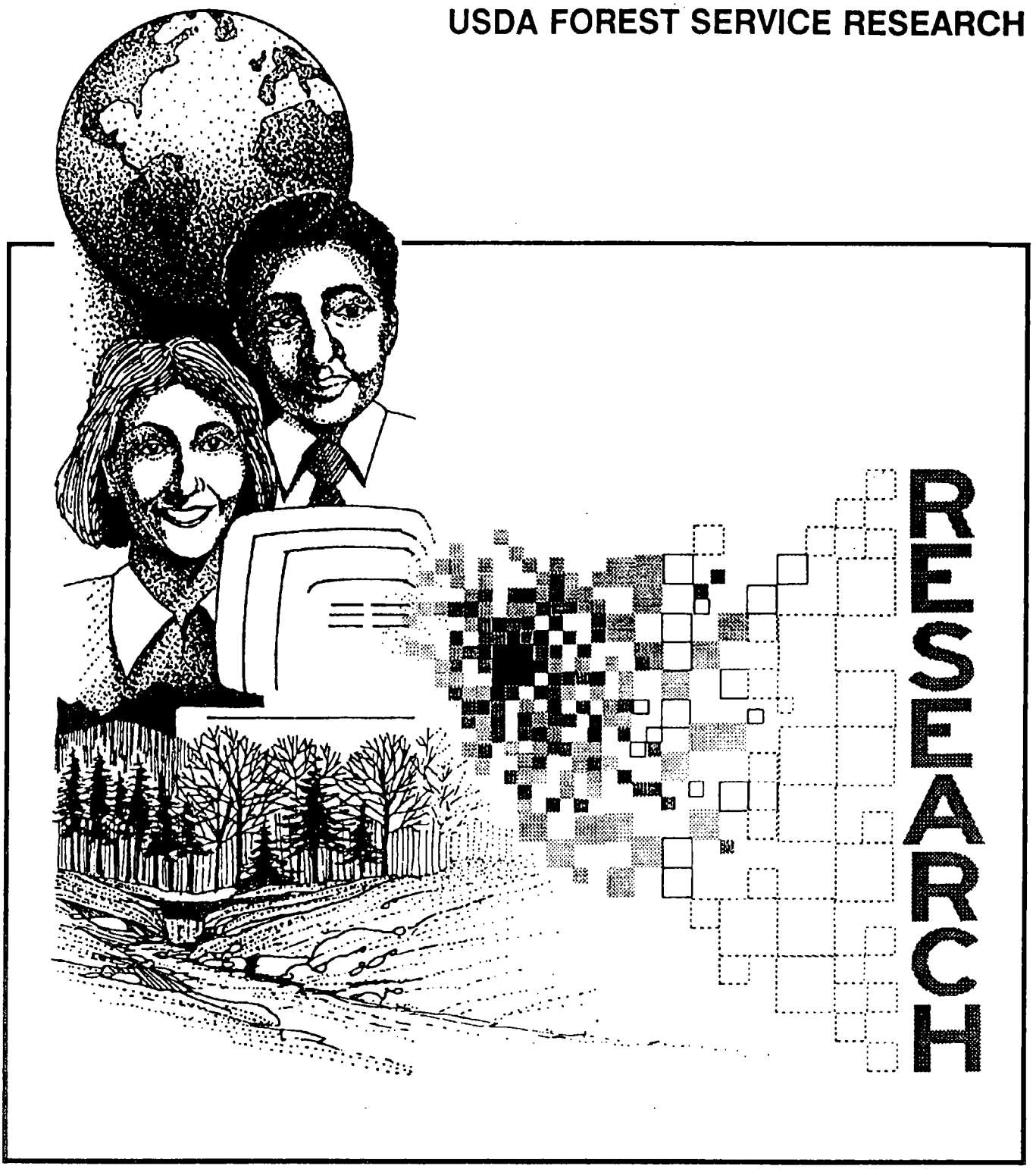
Clinton Presidential Records
Digital Records Marker

This is not a presidential record. This is used as an administrative marker by the William J. Clinton Presidential Library Staff.

This marker identifies the place of a publication.

Publications have not been scanned in their entirety for the purpose of digitization. To see the full publication please search online or visit the Clinton Presidential Library's Research Room.

STRATEGY FOR THE 90'S
for
USDA FOREST SERVICE RESEARCH



USDA Forest Service

Clinton Presidential Records
Digital Records Marker

This is not a presidential record. This is used as an administrative marker by the William J. Clinton Presidential Library Staff.

This marker identifies the place of a publication.

Publications have not been scanned in their entirety for the purpose of digitization. To see the full publication please search online or visit the Clinton Presidential Library's Research Room.

Forest Service Leaders in Conservation Research

United States Department of Agriculture
Forest Service
FS-528

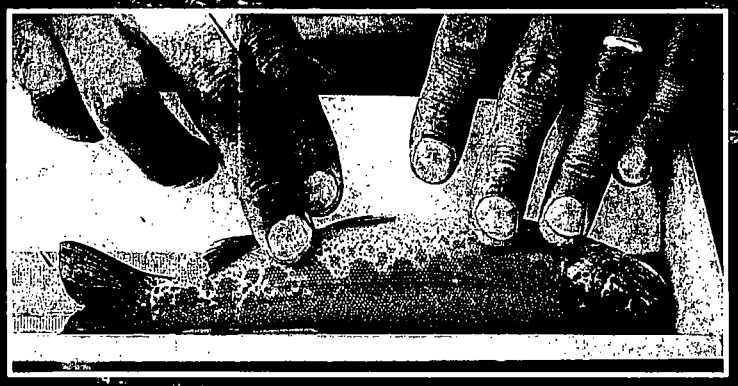
Clinton Presidential Records
Digital Records Marker

This is not a presidential record. This is used as an administrative marker by the William J. Clinton Presidential Library Staff.

This marker identifies the place of a publication.

Publications have not been scanned in their entirety for the purpose of digitization. To see the full publication please search online or visit the Clinton Presidential Library's Research Room.

Forest Service Research Highlights



United States Department of Agriculture
Forest Service
FS-519