ECOTONES IN A CHANGING ENVIRONMENT:

WORKSHOP ON ECOTONES AND GLOBAL CHANGE

Submitted
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Office of Health and Environmental Research
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by
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NOTICE FOR HANDLING PROPOSALS

Paul G. Risser — Date

Ann Powell — Date

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SUMMARY

The Scientific Committee on Problems of the Environment (SCOPE) has organized an international project to synthesize and advance current theory on the influence of ecotones, or transition zones between ecosystems, on biodiversity and flows of energy, nutrients, water, and other materials between ecosystems. In particular, the entire project is designed to evaluate the influence of global climate change and land-use practices on biodiversity and ecological flows associated with ecotones, and will assess the feasibility of monitoring ecotones as early indicators of global change. The later stages of the project will recommend landscape management strategies for ecotones that produce desirable patterns of biodiversity and ecological flows. The result of the project--a comprehensive body of information on the theory and management of biodiversity and ecological flows associated with ecotones--will be part of the planning for research to be carried out under the International Geosphere-Biosphere Program.

This proposal requests funds in the amount of $49,553 to support the second of three workshops to be organized under the project. This workshop, which will focus on Global Change and Human Impact on Ecotones, will be organized in the US in the early Fall, 1990. The first Workshop on Landscape Boundaries: Consequences for Biotic Diversity and Ecological Flows was held in December, 1988 in Paris, and a third Workshop on Managing Ecotones in a Changing Environment is planned for the USSR in 1991 and funds have been committed by UNEP.

BACKGROUND

The Scientific Committee on Problems of the Environment (SCOPE) is an international, non-governmental organization established in 1969 to identify and synthesize knowledge on environmental issues of global concern. In 1987, SCOPE organized a project to examine the role of ecotones--transition zones between ecosystems on scales ranging from as small as edges of forests or agricultural fields to as large as landscape boundaries between major biome types--in maintaining biotic diversity and flows of energy, nutrients, water, and other materials.

The project was adopted with the view that human activities are becoming increasingly prevalent in most landscapes and that these activities potentially alter both the geographic location and the mediating role of ecotones in maintaining ecological flows between ecosystems. Moreover, the effects of changes in the global environment, including global warming, large-scale changes in land-use, and reduction in number of species, might first be detected in ecotones which, by definition, are at the extreme limits of tolerance for change. Thus, ecotones may serve as useful indicators of changes not yet observed within the ecosystems themselves.

In its entirety, the SCOPE project has been designed to address four general questions:

- o How do ecotones influence biotic diversity and flows of energy, nutrients, water, and other materials?
- o How will biodiversity and ecological flows associated with ecotones respond to environmental change, especially to changes in global climate sea level, land use, and atmospheric trace gases?
- o To what extent will human alteration of ecotones influence global environmental change?
- o Finally, how should ecotones be managed within a changing environment?

ORGANIZATION OF PROJECT

The preliminary planning phase of the project was carried out during 1987-88, when the Scientific Advisory Committee appointed to organize the project (see Attachment A) met twice. An initial exploratory meeting was also organized jointly by SCOPE and Man and the Biosphere (MAB).

The resulting project is organized around three workshops. Each workshop is designed to be unique in terms of scientific questions addressed, organizational and editorial directorship, location, and final product. The workshops are linked, however, in that the product of one will be the point of departure for the next. Additionally, three ad hoc working groups will prepare special papers on the classification of ecotones, human impacts on landscape structure, and mathematical approaches for studying and managing ecotones.

The first workshop on Landscape Boundaries: Consequences for Biotic Diversity and Ecological Flows was held in Paris in December, 1988 (see Attachment B for program). A second workshop on Global Change and Human Impacts, for which this proposal requests funding, will be held in New Mexico in the early Fall of 1990. The third workshop on Managing Ecotones in a Changing Environment and a synthesis session will be organized in the USSR in early 1991. About 25 scientists are being invited to each of these 4-5 day workshops, with some scientists invited to all workshops for continuity and coherence. Proceedings from each of the workshops will be produced.

SCIENTIFIC BACKGROUND

SCOPE's adoption of the project reflects the on-going transition in the science of ecology to consider heterogeneity in ecological systems. Natural and human disturbances cause most ecological systems to be patchy at several spatial and temporal scales (Pickett and White, 1985). Most studies thus far have considered each landscape element or "patch" as a relatively

homogeneous unit and examined how patch size, shape, contagion, etc. influence variables such as genetic variation, population dynamics, species diversity, energy flow and nutrient cycling (see Mooney and Gordon, 1983; Sousa, 1984; Pickett and White, 1985 for review). Ecotones--the transition zones between patches--may mediate the structure and functioning of ecological systems by exerting control over the flow of materials, water, and energy between patches (Wiens et al., 1985; Johnston and Naiman, 1987). Ecotones may also serve as patches themselves, and provide primary habitats or refugia for species.

The extent to which ecotones influence ecological flows is not well known. Wiens et al. (1985) considered the factors that influence the spatial positioning of energy and material across a landscape. They identified vectors (physical forces and animals) that can transport materials against underlying edaphic gradients. Wind, for example, may transport nutrients or organisms upslope. Trajectories of these vectors are affected by patch boundaries. The degree to which boundaries block or deflect the movement of vectors is expressed as boundary "permeability," a function of both the characteristics of the boundary (e.g., width, position, physical structure) and of the vector (e.g., mobility, tolerance levels, within-patch density). Ecotones thus act as filters of flows between patches and, in doing so, exert control over patch processes. This conceptual model is supported by field studies documenting that ecotones influence the movements of nutrients (Peterjohn and Correll. 1984), disturbances (Sprugel, 1976; Odum et al., 1987), and animals (Gates and Gysel, 1978: Wunderle et al., 1987) across landscapes, although the generality of this effect is not currently known. Clearly, however, the study of interactions between landscape components has important implications for management of ecotones. The study of biotic diversity in ecotones has even more direct implications for management. The rate of species extinction has dramatically accelerated in recent decades, largely due to habitat alterations by human activities (Ehrlich and Ehrlich, 1981). This loss of biotic diversity is exceedingly costly on medical. agricultural, ecological, and aesthetic grounds (see Wilson. 1984). A related problem is the increase in the abundance of undesirable species. especially in

transition zones. Ruderal species (sensu Grime, 1979) are particularly apt to invade a region following human disturbance and to become pests (Crawley, 1987), frequently with considerable economic loss.

Species rarity and abundance are often related to landscape structure and, in particular, to boundary characteristics. Wildlife managers have long recognized that some types of ecotones support high diversity and abundance of vertebrates (Leopold, 1933; Dasmann, 1964). This "edge effect" is not universal, however. Ecotones subject to high levels of disturbance (e.g., the edges of unstable water bodies) may be poor in species (van der Maarel, 1976). Furthermore, the creation of habitat edges may reduce regional diversity because patch interior species are lost. The potential importance of ecotones for certain species and the importance of large, unfragmented reserves for others creates a difficult optimization problem for land managers (Diamond, 1978; Holland, 1987).

The SCOPE project will synthesize and advance current theory on the influence of ecotones on biodiversity and flows of energy, nutrients, water, and other materials. In particular, the project will evaluate the possible influence of global climate change and land-use practices on biodiversity and ecological flows associated with ecotones, and will assess the feasibility of monitoring ecotones as early indicators of global change. Finally, the project will recommend landscape management strategies for producing desirable patterns of biodiversity and ecological flows. The result of the entire project--a comprehensive and organized body of information on the theory and management of biodiversity and ecological flows associated with ecotones--will provide background information to the International Geosphere-Biosphere Program to design research that would 1) utilize ecotones for assessing global change and 2) investigate the possible impacts of global change on landscape characteristics and dynamics.

SCIENTIFIC ISSUES OF THE PROPOSED WORKSHOP

Unfortunately the scientific basis for expecting ecotones to be sensitive to global climate change is currently fragmented and located in disparate data sets. Moreover, the presumed sensitivity is inferred from largely intuitive assumptions (e.g. Frost, et al. 1986; Walker and Meanut, 1988). Putative reasons for responsiveness depend, for example, on explanations such as the following:

- o In an ecotone, many species are at their geographical or local range extremeties, and therefore, small changes in climate will tip the balance toward one or other of the adjacent biological communities.
- o Because ecotones are frequently rich in species and genetic diversity, any changes in climate will have major impacts on local, regional and global patterns of biological community composition.
- o Within ecotones there are steep gradients of ecosystem processes, such as nutrient retention rates, so even subtle changes in vegetation of ecotones will have particularly strong influences on the flow of nutrients, soil and water across the landscape.
- o Even small changes in the location or structure of ecotones can have large multiplier effects, such as the case where ecotones along croplands provide refuges for overwintering stages of agricultural insect pests.

Each of these suggested reasons for the importance of ecotones as responders to climate change is actually a hypothesis to be tested.

Identification of Types of Ecotones Most Likely to be Sensitive to Climate Change

The first task of the workshop will be to identify the types of ecotones which are most likely to manifest some detectable changes with a change in global climate. For example, one might suppose that if an ecotone was located on a gradual environment gradient, climate change would cause a noticeable shift in location. If the underlying environmental gradient was steep,

however, the location would remain relatively stable despite possible changes in ecotone vegetation and processes.

Contemporary ecotone location and structure might be caused by human activities or might be a function of past climate or disturbance history. Thus, predicting the sensitivity of ecotones to climate changes would depend in part on understanding their relationships with the predominant driving variables and influences such as past climatic conditions and human-caused or natural disturbances. Fortunately, there exists a reasonably large body of information describing ecotones (e.g., Aikman, 1928; Buell, 1956; Buell and Buell, 1959; Buell and Cantlon, 1950; Buell and Facey, 1960; Buell and Gordon, 1945; Buell and Martin, 1961; Curtis, 1971; Daubenmiere, 1954; Ferson and Stockton, 1985; Griggs, 1937; 1942; Kikkawa, et al., 1981; Marr, 1948; McAndrews, 1966; Tranquillini, 1979; Wardle, 1981; Weaver and Thiel, 1917; Westman, 1968).

The ecotone in north central North America, at the interface between the prairie and forest, has received considerable attention. J.E. Weaver and his students at the University of Nebraska documented the moving transitions between the shortgrass steppe, mixedgrass prairie and the true prairie during the droughts of the 1930's and 1950's. Also, treelines have proven to be particularly interesting because in some instances treelines appear sensitive to climate change, but in other cases, treelines appear as relicts of past climate conditions, i.e., existing but not reproducing. Currently a program at IIASA is being organized to study the taiga-tundra border as a means of first detection of biospheric response to global environmental change (A. Solomon, personal communication).

From existing studies, it should be possible to construct a framework with which to identify the independent variables that predict ecotone sensitivity. These independent variables will be classified and consist of characteristics of environmental gradients, conditions of the ecotones

themselves, and changes in intermediate controlling variables such as frequency of flooding, fires, or ranges of herbivores. Building this classification and predictive framework for the susceptibility of ecotones to climate change will be the first of three objectives of the proposed workshop.

There is, of course, the possibility that initial biological community responses will not entail movements or changes in ecotones, but rather degeneration of the community itself caused by the loss of the most sensitive species. Such a loss will permit invasion by species more tolerant to the changed environmental conditions. The result will be a successional transition from one community type to another, but without necessarily a change in ecotone location. This possibility will be explicitly discussed in the workshop, with the intent of relating this type of change to those conditions under which ecotones are likely to be sensitive indicators.

Ecological Processes Driving Ecotone Responses

The second objective at the workshop will be to evaluate models and other analytical approaches for relating ecotone structure and functional responses to climatic change. With few exceptions, most of the current studies have focused on changes in the distribution of vegetation and associated driving variables rather than specifically on the responses of ecotones or the transitions between vegetation units (Emanuel, et al., 1985; Manabe and Wetherald, 1986; 1987; Mitchell and Warrilow, 1987; Noble and Slatyer, 1980; Pennington, 1986). Thus, the approach used in the workshop will be to analyze the coupling of predicted environmental changes from general circulation models and more regional meso-scale models to the behavior of ecotones. Although several hierarchical methods are possible, the two most promising would appear either to (a) make gap models spatially explicit or (b) model the ecotonal processes themselves. Indeed these discussions and proposed approaches will be an intellectually rich and practically useful portion of the workshop. Workshop participants and presentations will be selected to represent both approaches.

Measurements of Ecotones

The third and last objective of the workshop will be to evaluate methodology for measuring changes in ecotones (particularly) and changes in biological community structure (more generally) by remote sensing techniques, coupled with mathematical models. This objective will involve methods of mathematically describing response characteristics of ecotones, such as shape, steepness of vegetation gradient, or changes in ecotonal conditions as compared to broader community responses. Particular emphasis will involve evaluation of remote sensing techniques for measuring the responses of ecotones (Botkin, et al., 1984; Justice, et al., 1985; Nellis and Briggs, 1989), including algorithms for detecting image patterns and for establishing statistical reliability of the measures and their interpretations.

PROPOSED WORKSHOP STRUCTURE

The structure of the Workshop will be organized around the scientific rationale and to address the major goals: (a) to assess which ecotones are most susceptible to global environmental changes, (b) to construct a framework that organizes the factors that underlie this sensitivity, and (c) to establish the most appropriate mathematical and image analyses techniques for measuring these responses. These three topics will be the subject of three plenary sessions and of three more intensive working groups (see Table 1).

PRODUCTS OF THE WORKSHOP

Unfortunately many workshops result in general treatments of topics without putting forth a synthesis of existing information and recommended research/application steps. This proposed workshop is designed to be a collaborative activity with DOE to produce specific products and to engage the best minds in the field in doing so. The three plenary sessions are designed to synthesize extant understanding and the working groups will recommend specific approaches. Each plenary session will consist of three speakers followed by a synthesizer who will draw

important and common lessons from the three papers. The three suggested lead plenary speakers are B. Walker (Australia), P. Grime (Great Britain) and R. O'Neill (U.S.); synthesizers will be J.-C. Menaut (France), A. Solomon (IIASA in Austria) and W. Westman (U.S.). Each working group will be led by a discussion leader who will have a set of specific questions to be answered. The three proposed discussion leaders will be R. Neilson, L. Brubaker and H.H. Shugart. Thus, the schedule provides four opportunities for the working groups and the Workshop leadership will ensure that each progresses expeditiously.

The resulting book will consist of an Introduction, papers from each of the plenary sessions, and a paper from each of the three working groups. In addition, the final summary will describe the research and applications program that will assist DOE and other agencies as well as individual scientists in the use of ecotones as indicators of global change. In a formal manner, the tangible result will be the book. However, an equally important product will be the availablity of these experts to DOE during the workshop, and presumably thereafter as desired by DOE.

POTENTIAL PARTICIPANTS

There will be approximately 18 participants from the United States and elsewhere. Since this Workshop is designed to assist DOE, the Principal Investigator will discuss invitations with the DOE Program Office before selecting the participants.

A. Sensitivity of Ecotones
   - D. Botkin
   - M. Cole, Great Britain
   - T. Dunne
   - J. Gosz
   - J.C. Menaut, France
   - R. Neilson
   - B. Walker, Australia
   - P. Wardle, Australia
   - P. Webber

B. Ecological Processes
   - L. Brubaker
   - D. Correll
   - H. Decamps, France
   - P. Grime, Great Britain
   - A. Isaer, USSR
   - O. Loucks
   - D. Schimel
   - R. Slatyer or I. Noble, Australia
   - A. Solomon
   - J. Wiens

C. Mathematical and Image Measurements
   - R. O'Neill or W. Emanuel
   - P. Sellers
   - H.H. Shugart
   - J. Tucker
   - W. Westman

Table 1. Tentative Workshop Schedule

	Morning	Afternoon	Evening
Day 1	Introduction Purposes of Workshop Summary of First Workshop held in Paris, 1988.	Plenary Session Sensitivity of ecotones and vegetation to global climate change	Reception
Day 2	Plenary Session Ecological Processes that influence sensitivity	Working Groups 1. Sensitivity 2. Ecological Processes 3. Measurements	Plenary Session Mathematical and Image Measurements
Day 3	Working Groups	Open	Working Groups
Day 4	Working Group Reports	Conclusion and Summary	

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ATTACHMENT A

ANNEX I

The International Scientific Advisory Committee for the project is composed of

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ATTACHMENT B

Final Program

A SCOPE WORKSHOP

12-15 December 1988

LANDSCAPE BOUNDARIES: CONSEQUENCES FOR BIOTIC DIVERSITY AND ECOLOGICAL FLOWS

Monday, December 12

9:30 Welcome and Objectives of the Workshop
F. di Castri, President of SCOPE
A. Hansen, Oregon State University
V. Plocq, Executive Secretary of SCOPE

SESSION I: GENERAL PROPERTIES AND PATTERNS Of ECOTONES

P. Risser, Chairman
G. Merriam, Rapporteur

10:30 Ecotones: Definition, scale, dynamics and significance
F. di Castri, CNRS - Montpellier and
A. Hansen, Oregon State University

11:05 Regional landscape boundary patterns: The responses of vegetation to subcontinental air masses
R. Neilson, Oregon State University

11:40 **DISCUSSION**

12:30 **LUNCH**

1:30 Ecotone dynamics in space and time
P. Delcourt and H. Delcourt, University of Tennessee

2:05 Ecological system functioning in transition zones: Interactions between climate, geomorphology, and the biota
J. Gosz, University of New Mexico

2:40 Human impacts on landscape patterning
J. Lepart and M. Debussche, CNRS - Montpellier

3:15 Quantitative methods for studying landscape boundaries
C. Johnston, J. Pastor, University of Minnesota and
G. Pinay, CNRS - Toulouse

3:45 BREAK

4:15 DISCUSSION

5:45 CLOSE

Tuesday, December 13

SESSION II: BIODIVERSITY AND ECOTONES: FROM GENES TO LANDSCAPES

J. Wiens, Chairman
R. Nielson, Rapporteur

9:00	Ecotones and conservation of biological diversity R. Peters, World Wildlife Fund and T. Lovejoy, Smithsonian Institution
9:35	Influence of boundary patterns on population genetics C. Gliddon, University of Bangor
10:10	Local extinctions, habitat fragmentation and ecotones G. Merriam and J. Wegner, Carleton University
10:45	BREAK
11:15	DISCUSSION
12:30	LUNCH
1:30	Distribution and dynamics of soil organisms across ecotones J. Rusek, Czechoslovak Academy of Sciences
2:05	Species diversity across landscape and biome boundaries A. Hansen, Oregon State University and D. Urban, University of Virginia
2:40	Physical and biological flows across coastal ecotones G.C. Ray, University of Virginia
3:15	BREAK
3:45	DISCUSSION
5:30	COCKTAILS

Wednesday, December 14

SESSION III: ECOLOGICAL FLOWS AND ECOTONES

J. Gosz, Chairman
P. or H. Delcourt, Rapporteur

9:00 Ecological flows across landscape boundaries: An overview
J. Wiens, Colorado State University

9:35 A percolation model of ecological flows
R. Gardmer, M.G. Turner, V.H. Dale and R.V.O'Neill, Oak Ridge National Laboratory

10:10 Does boundary shape influence organism movements?
R. Forman, Harvard University

10:45 **BREAK**

11:15 **DISCUSSION**

12:30 **LUNCH**

1:30 Energy and material flows across boundaries in agricultural landscape
L. Ryszkowski, Polish Academy of Sciences

2:05 Changes in plant ecophysiology across ecotones
M. Kuppers, Technische Hochschule Darmstadt

2:40 Geomorphic controls on ecotones: A landscape perspective
G. Grant, F. Swanson and S. Wondzell, U.S. Forest Service

3:15 **BREAK**

3:45 **DISCUSSION**

5:15 **CLOSE**

Thursday, December 15

SESSION IV: CASE STUDIES

J. Rusek, Chairman
C. Johnston, Rapporteur

9:00 Water flows and the dynamics of desert vegetation stripes
C. Montana, Instituto de Ecologia, Mexico,
A.F. Cornet, ORSTOM - Montpellier and
J.P. Delhoume, ORSTOM - Montpellier

9:35 Dynamics of alpine tree-lines
R. Slatyer and I. Noble, Research School of Biological Sciences, Canberra

10:10 **DISCUSSION**

10:45 **BREAK**

11:15 Alien plant invasions in tropical ecotones
J. Maheshwari, National Botanical Research Institute, Lucknow

11:45 Climate and vegetation interactions in transition zones
C. Fu, Academia Sinica, Beijing

12:15 **LUNCH**

1:15 **DISCUSSION**

SESSION V: FUTURE PROSPECTS?

F. di Castri, Chairman
I. Noble, Rapporteur

2:15 Modelling ecotone response to global climate change
D. Weinstein, Cornell University

2:50 Implication of ecotone research for landscape management
P. Risser, University of New Mexico

3:30 **BREAK**

4:00 **DISCUSSION**

4:15 Closing Statements
F. di Castri, CNRS - Montpellier

5:30 **CLOSE**

ATTACHMENT C

Table 2. Overview of activities planned for SCOPE project on ecotones

Attribute	Activity				
	Workshops			Special Papers	International Working Group
	I	II	III		
Subject	Influence of ecotones on biodiversity and ecological flows	Relationships between ecotones and global change	Management of ecotones within a changing environment	1 Classification of ecotones 2 Human impacts on landscape structure	Mathematical approaches for ecotone research and management
Format	4 day meeting with plenary papers and working groups	As in Workshop I	4.5 day meeting with plenary papers and working groups	To be decided by National Committees	Two informal work sessions of 2-4 days each
Number of Participants	~25	~25	~25	To be decided by National Committees	3-4
Date	December 1988	September 1990	Spring 1991	January 1989 to January 1991	June 1988 to January 1991
Location	France	USA	USSR or Czechoslovakia	To be decided by National Committees	Austria
Products	Commercially published book	Commercially published book	Book for SCOPE Series by John Wiley & Sons	Scientific journal articles	Scientific journal articles

Resume

Paul G. Risser

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CURRENT POSITION

Responsibilities

Dr. Risser serves as Vice President for Research at the University of New Mexico, a position held since July of 1986. Currently he also holds the position of Acting Vice President for Academic Affairs. His responsibilities include the academic and scholarship activities of 24,160 students (including approximately 4500 graduate students), 30,000 continuing education students and a faculty of 1,350. In addition, he leads the University's research program which involves grant and contract activity, university-business relations, and various organized research units, such as the Office of International Technical Cooperation, Bureau of Business and Economic Research, Technology Application Center, Center of Technical Excellence and others. The academic budget is approximately $70 million and the research budget is greater than $80 million.

The University's academic programs report to Dr. Risser, including the following colleges and schools:

Anderson Schools of Management
School of Architecture and Planning
College of Arts and Sciences
College of Education
College of Fine Arts
College of Law
College of Nursing
College of Pharmacy
University College
Division of Dental Programs
Division of Public Administration
Evening and Weekend Degree Programs

Dr. Risser also supervises several other organizations, such as Women Studies, African-American Studies, Native American Studies, Southwest Hispanic Research Center, Latin American Institute, University of New Mexico Press, KUNM-FM radio, and KNME-TV.

Academic programs are also offered under the responsibility of Dr. Risser at three branch campuses (Gallup, Los Alamos and Valencia) and two Graduate Centers (Los Alamos and Santa Fe). In addition, the University has an extensive instructional television system in several locations throughout the State, specialized facilities such as the Harwood Foundation in Taos, and several research properties where teaching and research are performed.

The University offers 75 baccalaureate, 55 Masters and 25 doctoral degrees. In addition. approximately 30 associate of arts degrees are offered at the branch campuses.

Representative Achievements

Dr. Risser believes that leadership involves shared responsibility and credit for successes at the University. Thus, none of the following would have been achieved without the collaboration of others, but these are activities in which Dr. Risser has led or played a significant role in encouragement and facilitation.

* Increased annual grant and contract expenditures from $56,668,000.00 to $67,140,880.00 and the number of externally funded awards from fewer than 580 to more than 800.

* Completed comprehensive analysis and recommendations concerning various components of the University, such as the intercollegiate athletics programs and the Anderson Schools of Management.

* Chaired the University's long range planning process called the UNM 2000 Plan.

* Developed the UNM-Business Link, an organization to foster collaborative efforts between the University and the private sector.

* Developed the UNM Faculty Scholars Program that permits six faculty members each year to devote a semester entirely to scholarly activity in a multidisciplinary environment.

* Chaired a committee to complete a comprehensive report on higher education in New Mexico.

* Assisted in the leadership and development of the New Mexico Plan, a comprehensive approach to increasing the gender and ethnic diversity at the University.

* Established and facilitated several research and scholarly multidisciplinary programs, such as the Center for Micro-Engineered Ceramics, Institute of Child and Family Studies, and Institute for Criminal Justice.

* Facilitating numerous ongoing programs and efforts such as special professorships with the private sector and public institutions, early retirement for faculty, affirmative action program committee, core curriculum, basic skills courses and academic assessment.

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Personal Information

Married; four children; born Blackwell, Oklahoma, September 1939

Education

1961	B.A.	Grinnell College, Grinnell, Iowa	Biology
1965	M.S.	University of Wisconsin, Madison	Botany
1967	Ph.D.	University of Wisconsin, Madison	Botany, Soils

Professional Experience

1961-1963	Jackson Memorial Laboratory, Bar Harbor, Maine Research assistant conducting studies in plant physiology
1963-1965	University of Wisconsin, Madison Teaching assistant in undergraduate and graduate courses
1965-1967	University of Wisconsin, Madison Research assistant, Wisconsin Alumni Research Foundation; National Science Foundation
1967-1971	University of Oklahoma, Norman Assistant Professor of Botany
1970-1974	University of Oklahoma, Norman Assistant Director, Biological Station, Lake Texoma
1971-1977	University of Oklahoma Associate Professor of Botany
1971-1977	University of Oklahoma Director, Oklahoma Biological Survey
1975-1976	National Science Foundation, Washington, D.C. Program Director, Ecosystem Studies
1977-1981	University of Oklahoma, Norman Professor of Botany
1977-1981	University of Oklahoma Chairman, Department of Botany and Microbiology
1981-1986	Illinois Natural History Survey, Champaign Chief University of Illinois, Affiliate Appointment as Professor, Department of Plant Biology
1986-present	University of New Mexico Vice President for Research Acting Vice President for Academic Affairs (Nov. 1989) Professor, Department of Biology

Research Interests

Study of the structure and function of grassland and forest ecosystems; environmental planning and management; landscape ecology and global change.

Books Written or Edited

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Risser, P.G. 1985. Grasslands. pp. 232-256. In Physiological Ecology of North American Plant Communities. B.F. Chabot and H.A. Mooney, eds. Chapman and Hall, Publishers. New York.

Risser, P.G. 1986. Preservation Status of True Prairie Grasslands and Ecological Concepts Relevant to Management of Prairie Preserves. Pages 339-344. In Wilderness and Natural Areas in the Eastern United States: A Management Challenge. Center for Applied Studies. D.L. Kulhavy and R.N. Connor, eds. Stephen F. Austin State University. Nacogdoches, Texas.

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Iverson, L.R. and P.G. Risser. 1987. Analyzing long-term vegetation change utilizing geographic information system and remotely sensed data. Advances in Space Research 7:183-194.

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1973 Ecological impact of weather modification in the southern Great Plains. Report to U.S. Bureau of Reclamation. Denver, Colorado.

1973 Ecological land use planning in Little River State Park. Report to Oklahoma Department of Tourism and Recreation. Oklahoma City, Oklahoma (with one co-author).

1973 Environmental assessment of the White Sands Missile Range, New Mexico. Report to U.S. Army, New Mexico (with two co-authors).

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1975 Field guide to Oklahoma. Oklahoma Biological Survey Technical Report No. 1. Norman, Oklahoma (with one co-author).

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1975 Biological inventories, wildlife ecology, primary alternative sites, proposed Prairie National Park, Kansas. Report to U.S. National Park Service. Denver, Colorado (with one co-author).

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1985 Summary of the Illinois Conference on Lake and Watershed Management. pp. 229-235. In University of Illinois. Water Resources Center. UILU-WRC-84-0015. Special Report No. 15. 319 pp.

1985 Conceptual model for soil erosional processes in Illinois. Report to Illinois Department of Energy and Natural Resources. Springfield, Illinois (with several co-authors).

1985 Conceptual model of erosion and sedimentation processes. Pages 199-208. Vth World Congress on Water Resources, Brussels (with two co-authors).

1986 Ecological Literacy. Bulletin of the Ecological Society of America. 67:264-270.

1988 The research support liaison committee in ecology, evolution, and systematics. Bulletin of the Ecological Society of America 69:6-10 (with two co-authors).

1988 Review of book entitled, Konza Prairie, A Tallgrass Natural History. O.J. Reichman. University of Kansas Press. Environment 30:29.

1988 Natural Resources of Tomorrow's Landscapes. Keynote address for College of Forestry and Natural Resources, Colorado State University, Fort Collins, Colorado.

1989 Review of book entitled, Ecology and Our Endangered Life-support Systems, E. P. Odum. Sinauer Associates, Sunderland, Massachusetts. BioScience 39:814-815.

1990 The Tallgrass Prairie. Article in The World and I. Published by the Washington Times Corporation (in press).

1990 Grassland Ecosystem. McGraw-Hill Encyclopedia of Science and Technology (in press).

Grants and Contracts

During the past 18 years, Dr. Risser has been the Principal Investigator or Co-Principal Investigator on 45 different projects with a total dollar value greater than 5.3 million dollars. These projects include basic research on ecological questions and hypotheses, applied questions relating to natural resource management, and science education. Funding sources include the following:

American Institute of Biological Sciences
American Climax Metals
Electric Power Research Institute
Illinois Department of Energy and Natural Resources
Illinois Department of Mines and Minerals
National Science Foundation
Oklahoma Department of Mines
Oklahoma Department of Tourism and Recreation
Public Service Company of Oklahoma
U.S. Army
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. National Park Service

U.S. Office of Surface Mines
U.S. Department of State

Elected Offices in Professional Organizations

1972-1973	President, Sigma Xi Chapter, University of Oklahoma
1975-1977	Board of Directors, Southwestern Association of Naturalists
1978-1979	President, Southwestern Association of Naturalists
1978-1982	Secretary, Ecological Society of America
1983-1984	President-Elect, Ecological Society of America
1984-1985	President, Ecological Society of America
1986-1990	Board of Directors, American Institute of Biological Sciences
1990	President-Elect, American Institute of Biological Sciences

Professional Consultantships

American Institute of Biological Sciences, Washington, D.C.
Argonne Advisory Board, Argonne National Laboratory, Argonne, Illinois
Arnold Thompson, Airport Consultants, White Plains, New York
Benham Blair and Affiliates, Oklahoma City
Blackwell Zinc Company, Blackwell, Oklahoma
Civil Service Commission, Dallas, Texas
Ecology Consultants, Inc., Fort Collins, Colorado
Ecosystems Center, Cornell University, Ithaca, New York
National Academy of Sciences, Washington, D.C.
National Audubon Society, Denver, Colorado
National Science Foundation, Washington, D.C.
Oak Ridge National Laboratory, Oak Ridge, Tennessee
Smithsonian Institution
Standard Oil Company, Houston, Texas
The Institute of Ecology, Indianapolis, Indiana
Time-Life Books, Alexandria, Virginia
U.S. Department of Energy, Washington, D.C.
U.S. Environmental Protection Agency, Washington, D.C.
U.S. National Park Service, Washington, D.C.
U.S. Office of Technology Assessment, Washington, D.C.
Williams Brothers Engineering Company, Tulsa, Oklahoma
Windstar Foundation, Aspen, Colorado

Current Positions on National Boards and Committees

1977-	Advisory Board, Konza Prairie, Kansas State University, Manhattan, Kansas.
1982-	Advisor, NSF Long-term Ecological Research, Central Plains Experimental Range, Fort Collins, Colorado.
1983-	Advisory Committee, U.S. Environmental Protection Agency, Center of Excellence, Cornell University, Ithaca, New York.

1984-	National Academy of Sciences, Board on Environmental Science and Toxicology, Environmental Studies Board, Washington, D.C.
1985-	Department of the Air Force, Air Force Office of Scientific Research, Life Sciences Research Advisory Board, Rolling Air Force Base, Washington, D.C.
1985-	Chairman, Public Affairs Committee, Ecological Society of America.
1985-	Executive Committee and Council, Ecological Society of America.
1987-	National Academy of Sciences, Committee on Global Change, Washington, D.C. Deputy Chairman.
1987-	Board of Editors, Journal of Landscape Ecology.
1987-	Scientific Advisory Committee, SCOPE Project on Ecotones. Chairman, Paris, France.
1988-	Scientific Advisory Committee, Institute for Ecosystem Studies, New York Botanical Garden.
1988-	Associated Western Universities, Inc. Board of Directors
1988-	Technical Advisory Panel, U.S. Environmental Protection Agency, Washington, D.C.
1988-	Health and Environmental Research Advisory Committee, U.S. Department of Energy, Washington, D.C.
1989-	Committee for IGBP Pilot Study on Database Interfaces, National Academy of Sciences, Washington, D.C.
1989-	Commission on Life Sciences, National Academy of Sciences, Washington, D.C.
1989-	Board of Editors, Ecological Applications.
1990	U.S. National Committee for Man and the Biosphere Program, Washington, D.C.

Past Positions on State and National Boards and Committees

1975	NSF Site Review, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
1975	NSF Site Review, Stroud Laboratory, Philadelphia, Pennsylvania, Chairman.
1975-1976	Chairman, Advisory Panel, Division of Environmental Biology, National Science Foundation, Washington, D.C.

1975-1976	Advisory Panel, Foreign Currency Program, Smithsonian Institution, Washington, D.C.
1975-1976	Chairman, Interagency Federal Committee on Ecological Reserves, Washington, D.C.
1975-1976	International Environmental Programs Committee, National Science Foundation, Washington, D.C.
1975-1984	Advisory Board, Kellogg Biological Station, Michigan State University, Hickory Corners, Michigan.
1975-1977 and 1980-1983	Advisory Panel, Division of Environmental Biology, National Science Foundation, Washington, D.C.
1975-1982	US-USSR Bilateral Committee for Ecological Reserves, U.S. State Department, Washington, D.C.
1976	NSF Site Review, San Diego State University, San Diego, California, Chairman.
1976	NSF Site Review, Utah State University, Alta, Utah, Chairman.
1976	NSF Site Review, University of Alaska, Fairbanks, Alaska, Chairman.
1976	NSF Site Review, Central Plains Experiment Station, Fort Collins, Colorado.
1976	NSF Site Review, University of Colorado Field Station, Boulder, Colorado.
1976-1977	Organization Committee, National Symposium on Classification and Evaluation of Fish and Wildlife Habitat, U.S. Fish and Wildlife Service, Washington, D.C.
1976-1981	Advisory Board, University of Oklahoma Biological Station, Norman, Oklahoma.
1977	NSF Site Visit, Konza Prairie, Kansas State University, Manhattan, Kansas.
1977	NSF Site Review, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
1978	DOE Site Review, Oil shale projects, Fort Collins and Boulder, Colorado.
1978	Departmental Review Team, Department of Botany, North Carolina State University, Raleigh, North Carolina.
1978	NSF Site Review, Kellogg Biological Station, Michigan State University.

1978-1979	Advisory Board, State of Oklahoma Water Quality Monitoring Program, Oklahoma City, Oklahoma.
1979	NSF Site Review, Rocky Mountain Biological Laboratory, Gothic, Colorado.
1979	Departmental Review, Ecology and Behavioral Biology, University of Minnesota, Minneapolis, Minnesota, Chairman.
1980	National Academy of Sciences, Research in the National Parks, Washington, D.C.
1980	Scientific Advisor, Agroecosystems Program, Colorado State University.
1980-1982	National Research Council, Environmental Studies Board of the Commission on Natural Resources, Washington, D.C.
1980-1982	Scientific Advisor, U.S. Environmental Protection Agency, Sulfur Dioxide Program, Corvallis, Oregon.
1980-1982	Scientific Advisory Board, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Chairman, 1982.
1980-1983	U.S. Department of Agriculture Science and Education Administration--Organic Matter and Nutrient Cycling in Semi-arid Agroecosystems, at Colorado State University, Fort Collins, Colorado.
1980-1989	Member of the MAB-8 Directorate, U.S. State Department, Washington, D.C.. Chairman, 1988-1989.
1981	Department of Energy Reviewer, Environmental Effects of Solvent Related Coal, Reston, Virginia.
1981	Advisory Board, Central Plains Experimental Range, Fort Collins, Colorado.
1981-1986	Governor's Interagency Committee on the Use of Pesticides, Springfield, Illinois.
1981-1986	Chairman, Editorial Board of U.S. IBP Publication Series, The Institute of Ecology, Indianapolis, Indiana.
1982	Committee on Soil Erosion and Water Quality, Illinois Department of Agriculture, Springfield, Illinois.
1982	External Reviewer of the Department of Botany Programs, University of Wyoming, Laramie, Wyoming.
1982	NSF-sponsored Workshop on Applied Environmental Biology Research Goals for the 1980's, The Institute of Ecology, Indianapolis, Indiana.

1982	NSF-sponsored Planning Workshop for the New Jersey Pinelands National Preserve, Rutgers University, Camden, New Jersey, Group Leader.
1982	NSF-sponsored Workshop on Data Management at Biological Field Stations, Kellogg Biological Station, Hickory Corners, Michigan, Overview Speaker.
1982-1983	Ad hoc Advisory Committee to the Assistant Director, National Science Foundation, Washington, D.C.
1983	Advisor, Hancock Biological Station, Murray State University, Murray, Kentucky.
1983	Advisor, Smithsonian Institution, Ecosystem Pattern Project, Maryland.
1983	Co-Director, NSF Landscape Ecology Workshop, Monticello, Illinois.
1983	Advisor, Land Reclamation Project, Argonne National Laboratory, Argonne, Illinois.
1983	INTECOL, Workshop to advise National Park Service on research policy, Callaway Gardens, Georgia.
1983-1986	Executive Committee of the Water Resources Center, Illinois Institute for Environmental Studies, University of Illinois, Urbana, Illinois.
1983-1989	Editorial Board, Bulletin of the Torrey Botanical Club.
1984	CSRS Review of College of Forestry and Natural Resources, Colorado State University, Fort Collins, Colorado.
1984	External Review Committee, Carey Arboretum, New York.
1984	Department of Energy, Reviewer, Complex Chemical Mixtures Program, Albuquerque, New Mexico.
1984-1985	Allerton Properties Improvements Committee, Monticello, Illinois.
1984-1986	NCA-23 Fisheries and Wildlife Committee, North Central Region as representative of University of Illinois Agricultural Experiment Station and of Illinois Natural History Survey.
1985	Review Committee, Department of Biology, University of New Mexico, Albuquerque.
1985	Bilateral Atmospheric-Biological Research, University Corporation for Atmospheric Research, Boulder, Colorado.
1985	Program Review, Chairman, New York Botanical Garden, Bronx.
1985	Co-leader, SCOPE Conference on Scaling, St. Petersburg, Florida.

1985	External Reviewer for Polar Programs, U.S. Department of Energy, Washington, D.C.
1985-1986	Chairman, Executive Committee of the Water Resources Center, Illinois Institute for Environmental Studies, University of Illinois, Urbana, Illinois.
1985-1986	Committee on Biological Diversity, Office of Technology Assessment, Washington, D.C.
1985-1988	Ecology Committee, Office of Health and Environmental Research, Department of Energy, Washington, D.C.
1985-1988	Environmental Advisory Panel, Argonne National Laboratory, Argonne, Illinois.
1986	Chairman, National Science Foundation Oversight Committee for Ecosystem Studies Program, Washington, D.C.
1986	External Reviewer, Department of Biological Sciences, University of Cincinnati, Ohio.
1986	External Review, Agricultural and Biological Sciences, Montana State University, Bozeman.
1986-1989	Chairman, National Academy of Sciences, National Scientific Committee on Problems of the Environment (SCOPE).
1987	External Reviewer, Biological Sciences, San Diego State University.
1987	External Reviewer, Ecology of Arable Lands, Uppsala, Sweden.
1987	Project on Wetland Ecotones, Man and the Biosphere, Toulouse, France.
1987	Program Review, DOE Arctic Project, Alaska.
1987-1988	Long-Range Planning for Ecological Research, U.S. Environmental Protection Agency, Washington, D.C.
1987-1988	Executive Committee, MAB-5 Project on Terrestrial-Aquatic Transitions.
1987-1989	Project Review, DOE Arctic Project, Alaska.
1988	External Reviewer, National Park Service Cooperative Unit, University of Wyoming, Laramie.
1988	New Mexico Research and Development Technical Advisory Committee, Santa Fe.
1989	External Reviewer, EPSCOR Program, North Dakota State University, Fargo.
1989	External Reviewer, Department of Botany, Iowa State University, Ames.

International Activities

Dr. Risser has conducted professional activities in the following countries: Argentina, Australia, Austria, Canada, Denmark, France, Great Britain, Hungary, India, Italy, Mexico, South Africa, Soviet Union, Sweden, Switzerland, Thailand, Venezuela, and West Germany.

Teaching Activities

During the 14 years at the University of Oklahoma, Dr. Risser taught graduate and undergraduate courses in the Department of Botany and Microbiology. He was the major advisor of 15 Ph.D. students, 13 M.S. students, and served on the Graduate Committee of numerous other graduate students at the University. At the same time, he served on many departmental, college, and university committees. Dr. Risser's responsibilities as Chief of the Illinois Natural History Survey did not permit teaching activities, although he advised one graduate student and was a member of three additional graduate student committees. At the University of New Mexico, he is a tenured professor in the Department of Biology where he serves on graduate student committees.

Administrative Experience

Dr. Risser's progressive administrative experience ranges from small to large, complex organizations, from a departmental chairmanship to university vice presidency, and from single-investigator studies to leadership of several multi-institution scientific studies. Briefly, these administrative experiences include the following:

1970-1974	Assistant Director of the University of Oklahoma Biological Station at Lake Texoma. Developed the academic programs and obtained research and scientific education grants.
1971-1977	Director, Oklahoma Biological Survey. Built a scientific program, largely from external grants and contracts. Supervised a scientific staff of approximately 25 individuals, ranging from post-doctoral investigators to undergraduate assistants.
1975-1976	Program Director for the Ecosystems Studies Program at the National Science Foundation in Washington, D.C. Administered the 14-million dollar program of scientific grants.
1977-1981	Chairman, Department of Botany and Microbiology, at the University of Oklahoma. Guided a department of 21 faculty members, about 65 graduate students and approximately 300 majors.
1981-1986	Chief, Illinois Natural History Survey, Champaign, Illinois. Directed a scientific staff of approximately 200. In existence since 1858, the Survey is the largest and oldest organization of its kind in the world. As Chief, Dr. Risser had responsibility for all scientific, educational, financial and administrative aspects of the organization. The Chief reports to the Board of Natural Resources and Conservation, which is appointed by the Governor of Illinois.
1986 -	Vice President for Research, University of New Mexico, Albuquerque, New Mexico. Directs the research activities of a university with 28,000 students and a grant and contract program exceeding $85 million.

By virtue of the University's administrative structure, Dr. Risser participates in essentially all administrative activities at the University of New Mexico. Moreover, he plays a significant role in a wide variety of responsibilities throughout the institution. Examples include: UNM 2000 which is the University's extensive planning process for the next Century; planning committee for the Anderson Schools of Management and search for Dean; evaluation of intercollegiate athletics and search for Athletic Director; the University's affirmative action and cultural pluralism process; and legislative affairs and public service activities.

Public Service

Elder, Presbyterian Church
Chairman, Pioneer Tri-County Library Board, Norman Oklahoma, 1979-81
President, Trustees Division, Oklahoma Library Association, 1980-81
Chairman, Oklahoma Natural Heritage Program Council, 1979-81
Illinois Nature Preserves Commission, 1981-86
Illinois Wildlife Habitat Commission, 1983-85
Illinois Commission on Forestry Development, 1984-86
President, Illinois Society for the Illinois Scientific Surveys, 1983-1986
Greater Albuquerque Chamber of Commerce
Albuquerque Rotary Club
KNME-TV Board of Directors