

Introduction

Geography in America has become more robust, more recognized, more marketable, more unified, and more diversified since the first publication of *Geography in America* (Gaile and Willmott 1989a). American geographers have built on geography's traditional strengths, while simultaneously embracing valuable new ideas and evaluating important new perspectives that have challenged the established theory and knowledge base of the discipline (National Research Council 1997). The robustness of American geography is well illustrated within the chapters in this book. Across the discipline from Geographic Information Science to the regional geography of Africa, American geographers have been able to respond constructively to new challenges and criticism, including the clear need to understand and evaluate the causes and effects of the events of September 11, 2001.

Defining and Characterizing Geography

American geography at the dawn of the twenty-first century can be characterized by its *unity amidst diversity*. While our traditional focus on place—and on spatial relationships within and among places—continues to provide unity, a growing variety of research problems, methods, subfields, and epistemologies is increasing our diversity. While we well recognize the difficulty in defining “geography” satisfactorily (Gaile and Willmott 1989b), we also are persuaded that an understanding of

our shared perspectives, principles, and goals holds the greatest promise for effectively integrating diversity into our discipline. For this reason, we offer a synopsis of the nature and practice of geography, which draws from earlier work and especially from the above-mentioned National Research Council (NRC) report.

Several years ago, Gilbert White asked us personally to define “geography,” and we give a slightly revised version of that definition and characterization here. We continue to believe that geography “is not bounded,” but now feel that a meaningful definition and characterization of the nature and practice of geography is both possible and useful.

Definition

Geography is the study and science of environmental and societal dynamics and society–environment interactions as they occur in and are conditioned by the real world. Geographic investigations into these are influenced by the character of specific places, as well as by spatial relationships among places and processes at work over a hierarchy of geographic scales.

Characterization

Reciprocal influences, i.e. of environmental and societal dynamics on geographic places and regions, are of commensurate importance within geography. Appreciation for and understanding of the interplay between societal and environmental dynamics within and across the myriad of geographic contexts is a recurring theme, as are field research and efforts to improve the quality of the human experience and the environment through informed intervention. Geographers, at an increasing rate, are investigating how processes and resultant patterns vary over the range of geographic

scales from the local to the global. They occasionally work to improve geographic theory but, more commonly, geographers' interests lie in solving real-world problems that have a significant geographic dimension. Geographic approaches to problem-solving (methods) are quite varied, but typically include visualization and digital analyses (often using maps or geographic information systems—GIS), as well as verbal, mathematical, and cognitive assessments.

Through the combined use of geographic theory, knowledge, and methods, geographers endeavor to describe, evaluate, explain, ameliorate, and forecast important changes taking place on the surface of the Earth. Most geographers also have a deep aesthetic appreciation for landscape and the web of interacting societal and environmental processes that produce it. Geography is a discipline dedicated to the understanding and appreciation of environmental and societal processes and their interactions.

Categorizing the Work of American Geographers

Categories of geographic research can be identified as much by their distinctive perspectives as they can by their subject matter (NRC 1997). A geographic work, as a consequence, can be categorized according to its perspective, its subject matter, or both, or perhaps by its modes of representation (visual, verbal, mathematical, digital, or cognitive). The NRC (*ibid.*) defined these three dimensions of geography as its "domains of synthesis" (subject matter), "... ways of looking at the world" (perspectives), and "spatial representation" (ways of representing geographic phenomena or processes). According to the NRC, three main "domains of [geographic] synthesis" can be described as "environmental dynamics," "environmental/societal dynamics," and "human/societal dynamics," while geographers' "ways of looking at the world" are designed to reveal "integration in place," "interdependencies between places," and "interdependencies among [spatial] scales." The elements of the third NRC dimension, "ways of representing . . ." are listed above. Process and change are at the heart of modern geography, and the NRC report underscored this by using the term "dynamics" in the name of each domain of synthesis. The NRC depiction of the three dimensions of contemporary geography was well conceived; thus, we use elements of it to help us identify main sections within this book.

Growth and Change over the Last Half-Century

Geography, as an academic discipline, changed fundamentally during the second half of the twentieth century. The number of geographers in the academy swelled substantially, as did the number of schools and colleges that teach modern geography.

The traditional, intellectual corpus of geography remains strong, despite significant change brought by at least three "revolutions" during the last half-century. The first of these was the Quantitative Revolution of the 1960s and 1970s, which was an effort to replace the descriptive "exceptionalism," which dominated geography for decades into the 1950s, with normative and empirical approaches to analysis and inference. The debate between Hartshorne (1955) and Schaefer (1953) is a classic that defined these positions (see Billinge *et al.* (1984) for a set of "recollections" of this revolution). The second revolution was Marxist in its orientation (see Harvey 1973, and early issues of the "radical" journal *Antipode*), and it was critical of certain practices and viewpoints, including reductionism associated with applied statistics, inequities inherent in the capitalist system, and, by extension, the Vietnam War. For the current state of this research see Ch. 15, from the Socialist specialty group. The concern for inequalities of power also precipitated the somewhat simultaneous evolution (as opposed to revolution) of a gendered geography (Hayford 1974). This evolution has reached "establishment" status (see Ch. 47, from the Geographic Perspectives on Women specialty group). Gender has established itself as an important approach to understanding, especially in human geography when differential power relations occur. More recently, the Postmodern Revolution (Harvey 1989; Soja 1989) was a wide-ranging critique of the academic system, and especially of its traditional modernist approaches to knowledge production. These three intellectual revolutions bear some striking similarities. All were reactions to weaknesses in the mainstream practice of geography at the time, and all acquired converts from the pool of successful mainstream practitioners, a number of whom became the champions of the revolution. All also spawned active cadres of "true believers" who, at times, denigrated the work of other geographers as irrelevant, wrong, or counter-productive. The three revolutions and challenges to orthodoxy have all waned, but each has made an indelible imprint on American geography.

There is no question that the intellectual growing-pains experienced during these revolutions were sometimes unpleasant; none the less, we believe that their

net influences on geography have made it a much more robust discipline. Consider, for example, that "empirical verifiability"—a maxim of the Quantitative Revolution—most certainly cannot answer all important questions, but it frequently can augment or strengthen our knowledge of a subject. It also is true that the dialectical approach offered during the Marxist Revolution—as well as the questioning of the system within which we operate—cannot always provide practical solutions, but it often sheds light on very important relationships between economics and power. And, while the Postmodern Revolution often left us without an adequate way of moving forward, it taught us to examine carefully the deeper meanings in our text, problems, and the very way that we go about producing knowledge. If there is one thing that we have learned, it is to be tolerant of alternative or even revolutionary thought as, in the end, it may be good for us.

portion of the report is devoted to characterizing the nature and practice of geography. This report's resorting of geographers' research and teaching interests and their "ways of looking at the world" into a three-dimensional "matrix of geographic perspectives" is particularly intriguing, and it helped guide the organization of the sections within this book. And, at this writing, a new assessment is being compiled by Donald Dahmann. It will be called the *Geography in America Timeline* (no relation to either this or the former *Geography in America* volume), and will chronicle the history of geography in the United States.

Of critical interest are new positions and debates ongoing in the discipline. Golledge's (2002) spatial vision of the nature of geographic knowledge is quite different from Turner's (2002) environment/society-based view. The debate in response to Turner (Butzer 2002; Kates 2002; Wescoat 2002) and the fact that Cutter, Golledge, and Graf (2002) had the courage to tackle the challenge of addressing what are the "big questions" in geography provide convincing evidence of the robustness of geography in America.

It is clear that American geographers continue to have an interest in examining their place in the world of academia, as well as the state of their discipline. *Geography in America at the Dawn of the 21st Century* is an effort to assess the latter, through the varied lenses of the specialty groups of the AAG. It is a reference work primarily. It attempts to present the most significant work done by American geographers in the last decade or so, since these contributions lay the foundation for geography in the twenty-first century. A reading of the following chapters will give you a relatively comprehensive understanding of what American geographers have been thinking about and been doing for the last decade or so.

Continuing Self-Examination

American geographers' introspection, with respect to the nature and practice of their discipline, has continued since the publication of *Geography in America* in 1989. Among these works was a rather different self-examination of the discipline, edited by Ronald Abler, Melvin Marcus, and Judith Olson, and entitled *Geography's Inner World: Pervasive Themes in Contemporary American Geography*. This innovative volume appeared in 1992, and it explored cross-cutting themes rather than specialty area or topical interests. Among the themes considered were geographers' modes of communication, analysis and modeling, and visualization amongst others. *Geography in America* and *Geography's Inner World* made fine companion volumes, since they both attempted to characterize geography in the 1980s or early 1990s, but from different perspectives.

Five years after *Geography's Inner World* was published, the National Research Council issued its report on *Rediscovering Geography: New Relevance for Science and Society* (NRC 1997). It reaffirmed that "location matters," and that understanding spatial relationships and place remain fundamental to understanding "the evolving character and organization of the Earth's surface." Its primary purpose, however, was to identify issues and constraints for the discipline, largely within the United States, as well as to clarify research and teaching priorities. Although written mainly for leaders and decision-makers from government, education, and the private sector, rather than for geographers, a sizable

A Community of Diverse Thought

Tradition and Stability

Each of the three revolutions of the last half-century tried to rewrite the essentials of geography. None succeeded in making revolutionary changes, but all contributed to the evolution and expansion of geography. It is safe to say that the traditions of geography have endured and are robust (NRC 1997), but now more in-depth thought and analysis—much of which was introduced by our revolutionaries—make the discipline a more rigorous and meaningful academic pursuit.

While current work tends to be more sophisticated than earlier contributions, many past contributions from geographers were seminal. Traditional geographic work was not characterized by multiple forms of understanding; none the less, it typically provided detailed and thoughtful findings, often obtained from hard-won field observations and experiences hitherto unknown. Reading Carl Sauer, Richard Hartshorne, Joseph Spencer, William Morris Davis, or C. Warren Thornthwaite inspires both a respect for their contributions, and an understanding of how newfound complexities and alternative perspectives can improve upon traditional approaches.

New Ways of Thinking

When the last *Geography in America* was published in 1989, social theoretical changes were rocking the foundations of the social sciences. Compared to the relatively modest shocks of applications of structuration (Palm 1986) and realism (Lawson and Staeheli 1991), new social theory was leaning towards the third revolution of Post-modernism and Post-structuralism.

The Post-Modern Moment

Several geographers, critical of contemporary geographic thought, looked outside the bounds of American academia to find inspiration in the signal post-modern works of Derrida, Foucault, and others. Post-modernism gained a cache in geography as it did in other social sciences. New journals were founded, "critical" became an icon, the "cultural turn" appeared, and "new" became an established euphemism for rejecting the past. Post-modernism not only did not accept the body of former knowledge, it clearly rejected it. Post-modernism was incredibly appealing from an academic standpoint by being intellectually hypercritical of all knowledge. While this heightened level of criticism did serve to expose problematic areas in geographic research, it also led to an intellectual cul-de-sac where nothing but criticism was acceptable. This criticism of the focus on criticism has led to its near-demise. None the less, the post-modern critique has left us all with better ways of inspecting our work.

Specialization Matures

Since the publication of *Geography in America* in 1989, specialization has matured in the discipline. As indicated

by a comparison of specialty groups now and then, specialization is both growing and evolving.

Specialization has always been a concern amongst the leaders of the AAG. They have witnessed other disciplines torn asunder, losing their unity to subdisciplinary schisms. The specialty group framework, initially advocated by the AAG in 1978, has allowed the discipline of geography to maintain its unity and celebrate its diversity. Of the fifty-three specialty groups existent in 2002, five have emerged since the inception of this book, four have merged to form two combined specialty groups, and three others have changed their titles. These changes are indicative of a healthy dynamism within the specialty group framework of the AAG.

Vital Signs

Geography's vital signs are strong. In the academic year 1999–2000, the discipline in the United States awarded 200 Ph.D. degrees and one-third of these were earned by women (US Dept. of Education Survey). This is the highest number of Ph.D.s awarded in the US since the mid-1970s. One key measure of the vitality of a discipline—jobs available for its Ph.D.s—is particularly encouraging for geography. Indeed, there are more jobs available currently for Ph.D. geographers than there are Ph.D.s to fill them. A recent *AAG Newsletter* (2002), for instance, reported that there were 1.3 geography jobs per Ph.D. produced by the American post-secondary education system in the academic year 2000–2001. Many of these jobs, of course, owe their genesis to the considerable and growing demand for education and training in GISci. The strength of geography departments within the American collegiate system has increased concomitantly over the last decade; and, now, there are more Departments of Geography than at any time in the past.

Geography curricula within the K-12 system also have expanded dramatically, owing in large measure to the establishment of state Geographic Alliances in the 1980s (Hill and LaPrairie 1989). The emerging importance of geography to the nation was summarized within the 1997 NRC report, *Rediscovering Geography: New Relevance for Science and Society*, and further recognized by the establishment of a permanent Geography Committee at the NRC. During the 1990s American geography enjoyed growth and increased recognition, and its prospects for the twenty-first century appear excellent.

Over the last decade American geographers have increasingly gained credibility. Geographers are frequently called to Congressional hearings, scientific forums, and discussions of global organizations. The

AAG Newsletter does a fine job of informing us of these many kudos and accomplishments. A classic example of such a geographer is Gilbert White who in 1999 was presented with the National Science Medal by President William Clinton. The mere facts that Nobel Peace Prize winner Kofi Annan spoke to the 2001 AAG Meetings in New York and that Nobel Peace Prize winner Nelson Mandela opened the 2002 International Geographical Congress in Durban speaks strongly to the highly credible image geography has forged for itself.

The AAG publication *Guide to Programs in Geography in the United States and Canada* appears annually and offers data to help assess our discipline's vital signs. As noted in the first *Geography in America*, there was considerable concern in the discipline when several university-level Geography departments were eliminated or lost their department status. This included such historically notable departments as Northwestern, Chicago, Michigan, Columbia, and Pittsburgh. Despite this, that book noted grounds for optimism, including the creation of twenty-first new degree programs since the 1970s (Gaile and Willmott 1989b: p. xxxiv). The current picture is much more optimistic. Between our first publication in 1989 and 2002, Geography programs listed in the *Guide* have increased notably. We have gone from 210 listed departments to 232 (a rise of 10%). Ph.D. programs have risen from 51 to 62 (a rise of over 20%)—for data see the *Guide* in respective years.

Membership of AAG peaked in the mid-1990s (at 7,381 in 1995) and is again on an upswing at 6,731 in 2001 (*AAG Newsletter* 2002: 8), about what it was in 1990. It is speculated that membership in all academic societies is being adversely affected by the greatly heightened access to free information on the World Wide Web. Geographers' main professional meeting, the annual meeting of the Association of American Geographers (AAG) in Los Angeles in 2001, attracted 3,741 geographers (*ibid.* 9).

In addition, new journals are appearing, research funds continue to flow, and geographers continue to play an important role in applied work around the globe. We have been able to maintain a loyal and optimistic view of our discipline. In sum, our vital signs of productivity, marketability, and institutional presence remain quite strong.

Overview of *Geography in America* at the Dawn of the 21st Century

Each specialty-group chapter has been placed within one of seven main topical sections. Parts I–III (Environmental Dynamics, Human/Society Dynamics,

and Environment/Society Dynamics) were those defined in *Rediscovering Geography* (NRC 1997). Placement was made according to whether the chapter deals mainly with natural processes, human/social systems, or the interplay between people and their environment. Chapters with a primary focus on approaches to representation (methods) were assigned to Part IV, Geographic Methods, while chapters concerned mainly with solving practical problems appear within Part V, Geographers at Work, which also includes the History of Geography specialty-group chapter. Part VI, Regional Geography, contains chapters with an overarching regional focus or orientation. Chapters with a strong ethical position or religious interest appear in Part VII, Values, Rights, and Justice. The main problem in assigning specialty-group chapters to Parts was, of course, that each chapter contained elements of all three NRC dimensions, as well as overlaps with other dimensions. None the less, we feel that we were able to assign the vast majority of chapters unambiguously to the most appropriate Part, based upon its primary affinity with that Part.

Environmental Dynamics

Prospects for global change—and by extension, regional and local change—has energized the traditional sub-fields of physical geography, which include climatology, geomorphology, and biogeography. Physical geographers continue to investigate those physical, biological, and chemical systems that influence the land surface, with a keen interest in the effects of human intervention. All types of environments have been examined, but cold regions have drawn special attention recently because global-change effects may be more dramatic there. American geographers' heightened interest in cold environments also spawned two new AAG specialty groups in the late 1990s, the Cryosphere Specialty Group and the Mountain Specialty Group. Issues of scale and nonlinearity, including sub-grid-scale biases and the determination of "appropriate scale," have become of concern across the spectrum of physical geography. Rapidly developing technologies, such as GIS and remote sensing, have allowed physical geographers to make more in-depth as well as more spatially extensive analyses of our "natural" world, while the processes at work there have been increasingly revealed through numerical modeling on the newest generation of very-fast computers. Within Part I, Environmental Dynamics, chapters written by members of the AAG's Climate, Geomorphology, Biogeography, Cryosphere, and Mountain Geography Specialty Groups document

the contributions of American physical geographers during the last decade of the twentieth century.

Biogeographers examine the distribution of organisms and the ecosystems within which species of interest live. Research often is approached from either an ecological or evolutionary standpoint, although applied work may involve blends of perspectives. Analyses of species and ecosystem responses to disturbance, of human-induced gaps within an ecosystem for instance, are increasingly important applications of biogeographic principles and methods. Topical interests included: plant and animal distributions; vegetation-environment relations; vegetation dynamics and disturbance ecology; influence of climate variation on vegetation; paleobiogeography; cultural biogeography; and nature conservation.

Geographer/climatologists have been working on a wide variety of climate and climate-related problems, although potential climate change is a frequently recurring theme. Research into the variability of atmospheric circulation—especially on interannual time scales—received a great deal of attention. Establishing teleconnections was of special interest, because they may foretell modes of regional or larger-scale variability in climate. Particular patterns of synoptic-scale variability were of interest as well, as they can be linked to human health-risk factors and mortality. Land-surface/climate interactions was another major theme, as was the interrelationships between climate and the hydrologic cycle. Other studies focused on the detection of climate change in observations or on the modeling and simulation of potential climate change. Communications among the members of the Climate Specialty Group—and with the larger community of other climatologists—was greatly enhanced by the development of a well-thought-out list server (*CLIMLIST*), developed by John Arnfield at The Ohio State University.

Cryospheric studies have come to the fore recently as the effects of global warming on snow, ice, and high-latitude ecosystems may be nontrivial. It has been conjectured, for instance, that increased melting of organic-rich permafrost may increase the rate at which CO₂ and CH₄ are emitted into the atmosphere. It also is possible that increased melting of glaciers, sea ice, or snow cover may further increase air temperature and raise sea level. Although many of the geographers who work in the cryosphere were trained as climatologists, geomorphologists, or biogeographers, their research tends to integrate approaches from all three subfields. Some work is theoretical, but much is empirical—based upon field or remote measurements in efforts to monitor and document variability and change. American

geographers also have been studying mountain environments for quite some time

Geographer/geomorphologists, in their investigations of landforms and landforming processes often concerned themselves with local- or regional-scale systems. They also worked to transform their subdiscipline into a more theoretically based science. The traditional concept of geomorphic equilibrium, for example, was re-examined, and chaos theory and nonlinear dynamics were offered as more comprehensive, organizing frameworks. Field observation remained a cornerstone of geomorphology, although efforts to integrate it with computational methodologies were explored. Topical areas of active interest were: fluvial geomorphology; eolian and coastal geomorphology; weathering; mass wasting, periglacial, and glacial geomorphology; Quaternary geomorphology; biogeomorphology, environmental geomorphology; geoarcheology; and planetary geomorphology.

However, interest increased to a level sufficient to form the Mountain Geography Specialty Group in 1999. Most research in this subfield has been physically oriented (hence the inclusion of this chapter in Part I, Environmental Dynamics), although there is an increasing interest in human-environmental relationships and sustainability within mountainous settings.

Human/Society Dynamics

Human/Society Dynamics retains its position of dominance in terms of the activity of American geographers, accounting for the greatest levels of membership in any of our six aggregated groups. Given the trends towards globalization and political transition, this has been an especially exciting area of research enquiry. It is within this area that the greatest level of theoretical development has taken place, including the Postmodern Revolution. It is also in this area that the events of September 11, 2001 will be of the greatest interest (see Clarke *et al.* 2002; Sorkin and Zukin 2002).

Cultural Geography is a topical area that is situated at the heart of the theoretical debate. This chapter very fairly illustrates the views of both “traditional” materialist cultural geographers and postmodern, non-materialist “new” cultural geographers. Cultural geographers explore culture, space, and landscape using humanist, structuralist, and post-structuralist approaches. They also study everyday life and popular and folk culture. This expansive group engages in research over a broad list of fascinating topics from the American street to cemeteries to rock and roll to landscapes of resistance.

Cultural Ecology is, on the one hand, one of the most traditionally rooted specialty groups in geography, and on the other one of the most highly active and dynamically changing specialty groups. Based on the works of Carl Sauer, Karl Butzer, and their followers, traditions flow deep. However, the evolution of “political ecology” has significantly transformed this tradition-based specialty group. Indeed, political ecology is one of the more exciting developments in geography in the past decade. As we go to press, the specialty group is actively discussing a name change to more formally incorporate political ecology, and this new work is detailed in Chapter 8.

Economic Geography also benefits intellectually from dynamism. In keeping with the rapid changes of the global economy, what was formerly the Industrial Geography specialty group renamed itself the Economic Geography specialty group. Indeed, simple former categorizations of industrial, mercantile, and service became increasingly irrelevant as the US economy became globalized and went through major transitions. In the US, there was transition from high volume to high value-added production, from industrial to knowledge-based production, from a focus on physical capital to a focus on human capital. The new blurred boundaries in the economic world provide a fertile ground for research.

Environmental Perception and Behavioral Geography (EPBG) has its strongest roots in the Quantitative Revolution and its behavioral sciences corollary. EPBG geographers study “human activities, human experiences, and all forms of empirical surroundings.” A great debate between quantitative and qualitative work is going on among ESPG geographers. Also, this specialty is in the forefront of research dealing with the virtual world.

Historical Geography has also benefited from heady debates between modernists and postmodernists. Historical geographers’ scholarship has thrived from working with other specialties with a variety of perspectives, notably, gender-based, GIS, and applied scholarship. Among the foci of historical geographers are world systems analysis, migration in the North American context, capitalist development from a historical point of view, human/environment interactions concomitant with land modification, and the examination of the geography of Native Americans.

The Berlin Wall came down in 1989 when the initial *Geography in America* was published (no causal inference intended), and political geographers have been working fervently ever since. The rapid demise of the Second World was clearly the singular most important event of the end of the last century. Coupled with the terrorist attack of September 11, 2001, political geographers

found themselves with much to understand and explain. The fertile new field of the “War against Terror” coupled with the traditional bailiwick of understanding elections (brought home by the Florida election debacle) keep these geographers very, very busy. Toss in the debates about the North American Free Trade Agreement (NAFTA), the World Trade Organization (WTO), and the World Bank and this group of geographers have a very rich current and potential research agenda.

Demographic dynamics challenge today’s population geographers. The First International Population Geographies Conference was held in July 2002 in St Andrews, Scotland, and Ch. 13 from the Population Geography specialty group clearly adheres to the focus of international work. The lines of research identified are dominated by migration and mobility. Fertility and mortality play a minor role. Issues of ethnicity, social context, and public policy strongly influence this research. A call to more strongly involve issues of gender, racism, ageism, and class conflicts is being heeded.

Geography has finally come out of the closet to acknowledge that Sexuality and Space are important topics for research and understanding. This insightful and provocative chapter goes so far as to question geography’s origins. Scholars in this field also are willing to explore admittedly *dangerous* work to provide important insight into our social fabric. A reading of this chapter will likely raise more new questions for geographers than any other in this volume.

One might initially think that the Socialist Geography specialty group was dismissed in the earlier part of this Introduction as part of the Marxist Revolution that has now passed. Yet socialist geographers effectively argue that it is important to challenge those economic and political structures that perpetuate inequalities (see the David Harvey quote near the end of this Introduction). These clever folk look at the production of knowledge in a challenging way. They continue to question orthodoxy and established systems, often focusing on issues of social justice.

Transportation geographers have clearly been on the move. The research of this group investigates societal change, sustainable transport, information and communications technology, globalization, and institutional issues. Whether “distance matters” is a topic that has featured on the cover of *The Economist*. It still does.

Consideration of most things urban changed after September 11, 2001. Urban geography will be faced with the strongest challenge to explore and explain these issues (see Clarke *et al.* 2002). Chapter 17, Urban Geography, clearly leans towards a post-structuralist interpretation of the city before September 11. Contested

spaces, spatial constructions of social life, and explorations of urban landscapes of resistance are all intellectually provocative. Whether urban geographers of all stripes can transform their existing research agenda and rise to the intellectual challenge of post-September 11 urban scholarship is a heady question.

Environment/Society Dynamics

Improving our understanding of relationships between environmental processes and human activities has been a goal of geographers for much of the twentieth century (Thomas *et al.* 1956). Recently, however, global-change research and “Human Dimensions of Global Change” initiatives have made us more keenly aware of the importance of understanding these relationships. The deleterious effects of misguided, human modification of our environment have become abundantly clear. In recognition of the many issues associated with human use of the environment, a growing number of geographers have begun to bridge the gaps between science and social-science approaches in order to study the links (and feedbacks) between society and the environment. Although systems of interest include significant, environmental, and social components, among American geographers social aspects received the most attention. Specialty group chapters within which the need to understand environment/society relationships is central in Part III.

A relatively new AAG specialty group (founded in 1995), the Human Dimensions of Global Change Specialty Group was established to help foster the “study of societal causes and consequences of changes in the global environment, as well as individual and institutional responses to these changes.” Many group members shared research interests that cut across the science/social-science or physical-geography/human-geography divide. Typical areas of interest were human vulnerability and adaptation, impacts of climate change, and the reasons for and consequences of land-use and land-cover change. In addition to their own research, a number of geographers in this area have been actively involved in crafting national and international research agendas in the global change and human dimensions of global changes arenas.

A comprehensive understanding of the production, disposition, and human use of water also requires expertise that intersects subfields of physical and human geography. Solutions to contemporary water problems—such as floods, droughts, wetland losses, and groundwater depletion—require a broad understanding of the

hydrologic cycle, and especially of the impacts of human activities on the cycle. Informed water-use policies, of course, also depend fundamentally on this understanding as well as on legal and ethical considerations. Much of the water-resources work by American geographers, however, was conducted from human geography perspectives. Questions of how best to manage the resources (policy and legal questions) are often central. Water-resources geographers examined problems across a broad range of scales, from individual and household to issues of national and international importance.

Energy production and use in the environment raises an extremely wide array of questions, as there are many forms of energy and energy-related resources. Geographers who study energy and environment must cut across geography’s subfields to investigate adequately and understand “earth-energy associations.” They have looked into virtually all types and phases of energy, including energies derived from fossil fuels, nuclear fission, and running water. Among geographers, a traditional focus has been on economics and availability, although geopolitical issues have increased in importance recently. An interest in efficiency and conservation, as well as in the development of sustainable energy resources and systems, has begun to develop.

Research in coastal and marine geography also expanded in response to the broader issues of global change and environmental degradation. Coastal and marine systems are intertwined; however, coastal and marine research tended to be segregated into three sub-areas: coastal physical geography, marine physical geography, and coastal-marine human geography. Coastal settings were of considerable interest because of their growing populations and economic importance, and their increasing vulnerability to sea-level rise and extreme weather. Marine research by geographers also expanded, in part, because of global-change interests in monitoring the ocean surfaces. Many aspects of the human geography of coastal and marine regions were investigated, including culture, economics, politics, resource management, and environmental and development planning. Assessments of risk and hazards were made as well.

It is significant that the Contemporary Agriculture and Rural Land Use (CARLU) and Rural Development groups are merging. Both shared the “rural” identity, but CARLU was largely domestic and Rural Development had a broader scope. Indeed, this merger points to the grass-roots origins of most specialty groups and indicates that the dynamism of the specialty group structure allows for reasonable change. CARLU attempts to understand the change in the American rural landscape.

The Rural Development specialty group has a more global perspective, looking at extractive industries, sustainability, and social capital.

Geographic Methods

Development and use of geographic methods grew rapidly over the 1990s. Technological advances in computing and satellite observation, in particular, laid the foundation for important contributions in geographic information science (GISci), remote sensing (RS), cartography, and mathematical modeling and quantitative methods (MMQM). Dramatic improvements in computational speed, visualization technology, and data-storage media not only made modern GIS possible, but they facilitated geographic modeling as well as the quantitative analysis of large spatial, especially remotely sensed, data sets.¹ Cartographic visualization and animation also benefited. Exploration of the innumerable possibilities made available by the Internet has only just begun. The 1990s saw unprecedented advances in geographic methods for analysis and modeling.

The field of GIS was quite young when the first *Geography in America* was published in 1989. The AAG GIS Specialty Group (SG) was youthful as well. Over the course of the 1990s, across virtually the whole of America, interest in GIS exploded, as it also did within the AAG. The AAG GIS SG grew rapidly, and became the largest SG within the AAG reaching a peak of 1,949 members in 2000 (AAG Newsletter 2002). Interests of its members expanded from primarily technical to a wide range of theoretical and practical issues inherent in geographic data and their analysis. The SG was evolving into a more broadly based Geographic Information Science organization. Among the emerging areas of interest were representational issues (e.g. how to represent “fields” and “objects”), analytical issues (e.g. how to incorporate spatial statistics and other forms of models), data quality and error propagation issues, integrating GIS with other media (e.g. decision-making tools, remote sensing, and environmental modeling), and GIS

and Society. The more traditional, technical issues (such as interoperability and parallel processing) continued to attract active investigation, however. Ethical, legal, and educational considerations also grew in importance. Perhaps the most fundamental weakness within GIS has been its limited ability to evaluate change over time or model (Willmott and Gaile 1992) the dynamics of process. None the less, there is no question that GIS is a most exciting subfield. Its far-reaching popularity also is imbuing a wide cross-section of Americans with an understanding of why “geography matters.”

Remote sensing (RS) is a means of observing and measuring aspects of the earth’s surface from a distance. Photographic and non-photographic instruments (usually aboard air- or space-borne platforms) have been used. As instrumentation continues to improve, the spatial and temporal resolution of the observations, as well as their accuracy, should do so also. Some of these improvements should be dramatic (e.g. spatial resolutions of < 30 m should soon be commonplace), and should allow for much more reliable analyses of land-surface patterns, processes, and change. Better observations of land-surface and environmental change are of particular interest in this age of global change, as are better approaches to obtaining social and population data from satellite-based observations. Other challenges facing the remote-sensing community include: dealing with staggering increases in available data; improving currently underdeveloped theories (models) of the mechanisms of change and then meaningfully observing those mechanisms remotely; and integrating RS observations with other types of geographic data. Remotely sensed data are fast becoming the major source of information about geographic change.

The subfield of cartography has been in transition since 1989, when the first *Geography in America* was published. Over the course of the 1990s, an almost complete automation of the cartographic process occurred, and significant portions of traditional cartographic work (e.g. terrain modeling, creation and refinement of geographic data structures, generalization, and spatial interpolation) became increasingly conducted under the guise of GIS. What was dynamic and interactive cartography also began to be referred to as “geographic visualization.” None the less, representational issues remained important (for mapping in general, including via GIS) and so cartographers continued to make important contributions to map design, symbolization, and generalization. Improvements were made, for instance, in the use of color, in automated type placement, and in the selection of the “best” map projection. Cartographers also introduced better models of generalization, feature

¹ A Geographic Information System (GIS) is a computer-based system for collecting, storing, manipulating, analyzing, and visualizing geographic and other spatial information. Emphasis on the technical aspects of GIS, however, has raised concerns that important issues were being overlooked. In an effort to insure that relevant intellectual and scientific issues—as well as the technical ones—are integral to the field, the more inclusive name of Geographic Information Science (GIScience or GISci) was proposed by Michael Goodchild. GIScience is more comprehensive than GIS, and is increasingly the preferred designation.

representation, and spatial interpolation, as well as approaches to interactive visualization and animation. Cartographic research into these and other areas of map design, communication, and generalization remains strong.

American geographers in the mathematical models and quantitative methods (MMQM) subfield produced a considerable amount of innovative research, even though the specialty group was relatively small. Advances in computational technology played a key role in the development and application of sophisticated (sometimes nonlinear) models, as well as in the analysis of very large data sets. A growing number of these approaches to data analysis, such as exploratory techniques, were integrated into GIS. Methods or areas of interest to both physical and human geographers included: chaos theory, cluster analysis, exploratory data analysis, Fourier analysis, fractal evaluations, linear programming, analysis and optimization of sample networks, neural networks, and spatial scale and aggregation. Within human geography, problem-specific models were developed to evaluate spatial behavior, choice, decision, and process, as well as the evolution of complex spatial systems. Within physical geography, problem-specific models were used to evaluate sub-grid-scale biases, spatial downscaling, and non-linear dynamics. Many specific models and methods are described in Ch. 27. The 1990s were a very productive decade for geographers who contributed in the MMQM subfield.

Geographers at Work

The late Peter Gould's *The Geographer at Work* (1985) is an impressive volume that addresses the interaction of the intellectual and pragmatic work of geographers. Today's geographers do not "assume away" the real world in order to achieve some theoretical purity. Many geographers are actively involved in using a high level of scholarship to address real-world issues.

In 1989, *Geography in America* began with a chapter on Geography Education. The reasoning then was simple. This disciplinary area had been rejuvenated by the efforts of Dave Hill, Nick Helburn, and Bob and Sarah Bednarz, amongst others. The continuing efforts of this group of scholars/educators have made a significant impact on the official presence of geography in the national educational arena. The evolution of the Geographic Alliance network is one of the best things that has happened to geography in the last two decades. The inclusion of geography into the five educational standards advocated by the Clinton Administration

is a clear signal that geographers' messages are being heard.

Things that could get you!—these could well define the topics of hazards research in geography. Stemming from the seminal works of Gilbert White, geographers have made impressive strides in informing about the risk of hurricanes, floods, tornadoes, earthquakes, and other natural disasters. They have also been very active in exploring the area of human-made disasters such as nuclear-risk.

Spatial diffusion studies stemming from the Quantitative Revolution of the 1960s have strongly influenced studies of epidemiology. Medical geographers have built on this core of expertise. This group's research not only identifies possible interventions, but also identifies secondary factors that play a strong part in disease transmission. Contemporary medical geographers also uncover contextual explanations for the prevalence of disease.

The initial *Geography in America* did not include military geography, since there was no specialty group at that time. The important reality of geographers' work in military intelligence in and after World War II need not be denied. Ranging from simple tasks of map-reading to complex tasks of geopolitical understanding, military geographers work in a very applied fashion based on the needs of national security. Geography is a major part of any conflict. Until we live in a utopian conflict-free world, military geography should be a major part of our research effort.

Old folks rule! The Aging and Aged specialty group clearly focuses on the demographic shift where elderly people have a much more predominant position in American society. How our retiring populations migrate, what their needs are, and how they impact local governments is a truly rewarding field of research.

Let's have fun! Let's understand having fun! The easily disparaged Recreation, Tourism, and Sport specialty group in fact attempts to understand the soul of society; it has gained respectability, especially since tourism is now regarded as a major factor in local economic development. Geographers have engaged in research that explains human behavior in new areas. It is admitted that these geographers studying fun deserve serious respect.

Applied geographers most often find themselves in a client-driven, problem-solving work mode. They work for the Census, US Agency for International Development, the World Bank, the State Department, the Department of Housing and Urban Development, and a wide variety of Non-Governmental Organizations. These geographers are on the front line of policy initiatives.

A new specialty group in geography focuses on the history of geography. It is the work of geographers to chronicle their research advances. This volume especially prizes such documentation and hopes to find a place in its critical chronology.

Regional Geography

The study of geographic regions has always been in the mainstream of the work of geographers. Whether they be geomorphologists, cultural geographers, or remote sensors, geographers have often specialized in a region in addition to their topical or methodological specialties. Indeed, regional geography, academically strongest during the "area studies" era of the first half of the twentieth century, has weathered the storms of the various "isms" and continues to play a central role in geographic research. It is important to note that not all regions one might find in a World Regional textbook are represented by specialty groups. Further, there is clearly some overlap (e.g. specialty groups exist for both Asia and China). Much of the work in the regional subfields will be cross-referenced in other topical chapters in this volume.

Africa has witnessed signal changes in the last decade. Apartheid ended in South Africa, democracies grew where dictatorships previously prevailed elsewhere in Sub-Saharan Africa, and social development in health and education made major strides. None the less, the media focused attention on the crises that gripped the continent versus the successes that were achieved.

Africa remains a favored playground of development theorists who explore post-colonial, post-structural, and postmodern approaches to the study of its geography. Political ecology finds fertile fields for development here. The Boserupian argument received major attention by geographers arguing about the relationships between agricultural intensification and population change, including "More People, Less Erosion" (Tiffin *et al.* 1994). Additional studies of migration, refugees, environmental change, and globalization make the work of this specialty group such that it has a broad impact on many of our substantive subfields.

American Ethnic Geography focuses on the experiences of ethnic groups in the United States and Canada. This group traces its roots to the quantitative revolution and the Civil Rights movements of the 1960s. Over the years it has blended traditional cultural geography with historical and population geographies to explore both past and current geographical and spatial trends in ethnic studies, including revitalization studies.

The diverse study of American Indian issues by American geographers spans the gamut from physical sciences to the humanities. Its long history in geography dates back through the Berkeley School. A primary focus on land and legal issues is clear. Yet revolutionary research is occurring in this subfield, including Shari Fox's (yet unpublished) research on Inuit perceptions of climate change. The Canadian Studies Specialty Group studies some similar issues, but also focuses on new cross-border studies, including the effects of the North American Free Trade Agreement (NAFTA).

The Asian and China Specialty Groups study an amazing array of dynamic changes, including the very important political and economic transitions of recent years. Understanding the Middle East is more critical than ever in the wake of September 11, and a small band of geographers is exploring this difficult-to-research region in the tradition of geographer Sir Richard Burton. Making Asia less enigmatic is a goal of American geographers. Whether it is the complexity of the transitions in India, Indonesia, or Vietnam, our scholars are applying themselves to understand contemporary changes happening against a context of deep histories. In China, the transition to a market economy and the incorporation of Hong Kong stand juxtaposed against Western models of transition (e.g. the World Bank Structural Adjustment model of change). China is more open to study than before and American geographers have clearly risen to the opportunity.

It is important to note that during the production of the last *Geography in America* no European specialty group existed. This glaring omission has been rectified, and is especially fitting given the coincidence with Europe's bold experiment at economic and political integration—the European Union. Shedding some of their parochialism, American geographers have become engaged in a variety of collaborative research efforts with European geographers in a wide array of research areas. The fall of the Berlin Wall in 1989 increased the interaction and unification of the former East and West European territories (most notably in Germany). It also led to major political and economic changes in the former Soviet Union which are well documented by research from the Russia, Central Eurasian and East European specialty group.

Geographic studies in Latin America continue to maintain an important place in scholarly research on the continent. This very solid specialty group provides a comprehensive documentation on the wide array of research on path-breaking themes. Stemming from tradition cultural ecological research, new and important political ecology studies are emerging. Development

studies include the increasingly important issues of social capital and civic society, and sustainable development has established strong roots in Latin America, signaled by the Rio Convention. Global change studies of forests, oceans, and other biospheres inform our understanding of major climatic events.

None of these brief summaries provides a satisfactory introduction to the wealth and breadth of research that occurs in the regional chapter, research that spans the full range of geographic enquiry. What is important is that geographers remain committed to regional research and to solving problems in specific places.

Values, Rights, and Justice

Perhaps one of the most prominent and laudable changes made by geographers since the last publication of the initial *Geography in America* in 1989 is signaled by the advent of specialty groups focused on issues of values, rights, and justice. Three new specialty groups emerged since 1989 with foci on ethical issues. To this assemblage we have added the Geographical Perspectives on Women specialty group, acknowledging that its focus on unequal gender-based power relationships strikes at the heart of questions of values, rights, and justice. It should be noted that, since this publication began production, the Values, Ethics, and Justice specialty group has merged with the human rights group founded in 1997. The Values, Ethics, and Justice specialty group immediately began to ask important questions. The single query, "How far do we care?" calls into question a wide range of foreign policy initiatives and responses. Ethical questions cut across the entire discipline, and the group has taken up the challenge to address and analyze them. Certainly issues of feminism, sexuality, socialism, and native identity come strongly into play.

Geographers responding to the human rights agenda have addressed issues of oppression from gay rights to women's rights. Chapter 46 lauds the diverse efforts of Richard Hartshorne, Harold Rose, Gilbert White, and Richard Morrill for advancing human rights understanding. The study of human rights is extremely complicated, given the importance of the problems and the weakness of the data involved. Combining qualitative, quantitative, and ethical perspectives, geographers in this area contribute both ethical and pragmatic research to inform policy-makers spanning the local-to-global continuum. Rex Honey deserves special commendation for championing this group's effort.

The authors of Ch. 47, Geographic Perspectives on Women, notes that gender and feminist perspectives

are now commonly found in textbooks, course offerings, and recent publications in geography. This was not the case when the first *Geography in America* was published. The maturation of this specialty group is evident in feminist analyses of methodology and in approaches to pedagogy. In addition, the progress in geography on studies of identity and difference has been led by female geographers. Contributions to research on gender and work, Third World development, and cultural geography round out the prevalent work of members of this specialty group. As this chapter indicates, there is every reason to believe that gender and feminist research will continue to make major advances.

The study of the geography of religion and belief systems concerns another new specialty group that explores issues of values and ethics. In today's world of religion-influenced crises, it is more incumbent on geographers than ever to understand other religions and belief systems. In addition to traditional empirical studies, Ch. 48 includes both humanistic and critical approaches to this important topic.

Challenges Facing American Geography

How times have changed! Geographers *do* need to become better forecasters. Since the publication of *Geography in America* in 1989, geographers face a daunting research agenda. Global warming is not mere speculation. The digital era has changed computer, remote sensing, and all locational prospects. Globalization has caused a serious rethinking of both political and economic geographies. Human rights now have a voice. The environment has global representation as witnessed by the succession of summits, most recently in 2002 in South Africa. South Africa itself is now led by a democratic majority and is exploring significant changes to its geographic landscape, e.g. in terms of urban demarcation. The Cold War is over, the Berlin Wall has been breached, but geopolitics still plays a heady roll. Global conflicts take on a very new set of dilemmas. Human rights matter. The debate over HIV/AIDS and prescription drugs raises huge ethical versus capitalist questions. The supra-national organizations of the World Bank, the International Monetary Fund (IMF), and the Global Agreement on Trade and Tariffs (GATT) both "rule the world" and raise protests around the globe. Indeed,

recent events charge American geographers to better explain our world.

The events of September 11, 2001 affected everyone's views and many research agendas (see Clarke *et al.* 2002; Sorkin and Zukin (2002)). Geographers, with their charge of understanding the world, were more affected than most. As Neil Smith, a resident of south Manhattan who experienced the event at close hand said, "All terrorism is local" (Smith 2001). David Harvey (2002: 61) states the left position cogently:

For those who have a more jaundiced view of what neoliberal globalization and market freedom have really been about in these last few years, the towers therefore symbolized something far more sinister. They represented the callous disregard of U.S. financial and commercial interests for global poverty and suffering; the militarism that backs authoritarian regimes wherever convenient (like the Mujahadeen and the Taliban in their early years); the insensitivity of the U.S.-led globalization practices to local cultures, interests, and traditions; the disregard for environmental degradation and resource depletion (all those SUV's powered by Saudi oil generating green-

house gases and now, in New York City, adorned with plastic U.S. flags made in China); irresponsibly selfish behavior with respect to a wide range of international issues such as global warming, AIDS and labor rights; the use of international institutions such as the International Monetary Fund and the World Bank for partisan political processes; the shallow and often hypocritical stances with respect to human rights and terrorism; and the fierce protection of patent rights of multinationals (a principle that the U.S. enforced with respect to the AIDS epidemic in Africa but then cynically overthrew when it needed Cipro drugs to combat the anthrax menace at home).

David Harvey is probably our most insightful geographer. Faced with these chains of clear blame, many might well surrender—but to where? We do live in an imperfect world. Pragmatists would argue that we get past this in the best way, both ethically and pragmatically. Indeed pragmatism is revitalized in geography (Wescoat 1992). The debate between the theoretical and the practical should always take place in academia. In geography it continues, and that is very healthy.

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PART I

Environmental Dynamics

Biogeography is the study of the distribution of plants and animals in space and time. It is concerned with the relationships between interdisciplines such as geomorphology (e.g., Odum 1986). Veblen (1909) defined biogeography in the broadest sense as "the study of biogeographical regions, provinces, finding their boundaries and extent with exactness." Three broad approaches have been used (R. R. Young 1990): descriptive, comparative, and applied. Each orientation has its own frameworks and empirical approaches to the problem. In current biological and geological studies, interactions among species, climate, substrate, vegetation, and soil are often analyzed. These approaches account for changes in species over long periods of time, as well as historical processes as affected by tectonics, and climate change. The first approach has been labeled as "classical biogeography" and the second as "complete biogeography" (see also detailed information on both approaches in historical changes over centuries and millions of years. Biogeographical

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GEOGRAPHY IN AMERICA

AT THE DAWN OF THE 21ST CENTURY



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