they look for "more rigorous analysis," then they could miss the forest for the trees.

Second, these articles generally appear to conflate the ideas of *conflict* and *security*, assuming that if a region or nation is free from conflict, then by definition it must be secure. This assumption is faulty, as a nation does not have to engage in conflict in order to be insecure. The recent and startling data on Arctic ice melt provides a sterling example of an emerging area of insecurity for many circumpolar nations that has not (yet) devolved into conflict, whereas the pastoral conflict that Meier, Bond, and Bond examine does not rise to the level of a national security threat (though they do not claim that it does).

What the scholarly literature on climate and conflict needs now is not more theory or more attempts at statistical correlation, but opportunities to test out the existing theories on a subnational scale. This issue of *Political Geography* has opened the door to an upcoming and important field of research.

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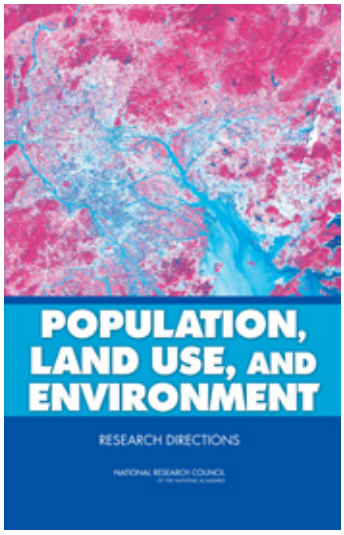
Population, Land Use, and Environment: Research Directions

Edited by Barbara Entwistle and Paul C. Stern
Washington, DC: The National Academies Press, 2005. 321 pages.

Reviewed by DAVID L. CARR



As seen from space, land cover change is far and away the signature imprint of human habitation on the surface of the Earth. What is driving changes in land use and the environment? What is the role of population? In addressing these questions, *Population, Land Use, and Environment* presents the goals and research directions of the National Research Council's (NRC) Panel on New Research on Population and the Environment along with state-of-the-art case studies. The three sections of this volume, edited by Barbara Entwistle and Paul C. Stern, focus on land use or land cover change where population is a prominent driving force.

David Carr of the University of California, Santa Barbara, has served as principal investigator on grants from NASA, the National Institutes of Health, and the National Science Foundation, and has authored more than 50 publications on land use/cover change, protected areas, migration, fertility, and health in the tropics.

The first section reviews the state of knowledge in the field; the second recommends research directions; and the third features 10 papers representing current research trends.

The editors of *Population, Land Use, and Environment* observe that recent investigations have expanded our understanding of the influence of human population on the environment to a host of factors beyond mere population growth, including migration, population density, and age structure. They understate, perhaps, the fact that population variables by themselves rarely emerge as overwhelmingly predominant forces driving land-use change; much more commonly, they operate in tandem with socioeconomic, political, and ecological processes.

More than a decade of research on population-environment interactions has produced studies tracking population, land use, and environment dynamics over several (or more) years in diverse geographic regions. These research projects were catalyzed by targeted land use/cover change funding mechanisms and the emergence of international research networks, including the international Land Use/Land Cover Change Project and its successor, the Global Land Project, hosted by the International Human Dimensions Programme on Global Environmental Change (IHDP) and the International Geosphere-Biosphere Program. Importantly, such research has also been enhanced by technological innovations in remote sensing from space. *Population, Land Use, and Environment* offers seven recommendations for researchers in the field, including:

- Increased coordination;
- The examination of causal relationships among specific component factors of population, land use, and environment;
- The combining of population, land use, and environmental variables;
- The exploration of cross-scale interactions;
- The development of linked datasets;
- Increased efforts to model and quantify causal relationships among population, land use, and environment; and
- The identification of highly effective mechanisms to facilitate interdisciplinary research.

How to increase coordination is hotly debated among human-environment scholars, but such controversy aside, coordination is crucial to achieving holistic policies. The second recommendation may understate the role of other factors, particularly economics. Exploring cross-scale interactions remains a major challenge, which is admirably if incompletely addressed in many of the research papers included in the volume.

Developing linked datasets is a key step in moving beyond disaggregated local case studies and large-scale regional and global efforts informed by unreliable or inconsistent data. For example, we could leverage the comparative advantage of existing large-scale surveys that cover areas of dynamic human-environment interactions such as the USAID-sponsored Demographic and Health Surveys (DHS). Advances in novel techniques such as agent-based modeling, spatial and hierarchical statistical approaches, and the integration of methods from the physical and social sciences have furthered efforts to model causal relationships. Additional synergy is promised by funding mechanisms of the National Science Foundation and the National Institute of Child Health and Human Development, which promote cross-disciplinary research and integrated curricula. The emergence of scholarly networks and institutions such as IHDP and the Population-Environment Research Network (PERN) has also facilitated such interdisciplinary work. As more research funding moves toward climate change mitigation and adaptability, funders should be reminded that land-use change is intimately associated with climate outcomes and their impact on human and natural systems.

The third and final section of *Population, Land Use, and Environment* presents 10 research papers that exemplify recent population and land-use research. Two papers focus on agricultural frontiers with dramatic population and forest cover change. "Population and Environment in Amazonia: Landscape and Household Dynamics" by Emilio F. Moran, Eduardo S.

Brondizio, and Leah K. VanWey challenges the orthodoxy of a linear relationship between population size and deforestation. Survey and land-cover data from multiple years demonstrate non-linear relationships between demographic variables, land use, and primary and secondary forests in the Brazilian Amazon. "Population Change and Landscape Dynamics: The Nang Rong, Thailand, Studies" by Stephen J. Walsh et al. integrates time-series data of remote images with socio-economic and demographic surveys.

Similarly pioneering methods are employed in "Economies, Societies, and Landscapes in Transition: Examples from the Pearl River Delta, China, and the Red River Delta, Vietnam" by Karen C. Seto, which investigates economic and political policies that could impact land-use change and urbanization. Two other studies investigate urban land-use change. "The Urban Ecology of Metropolitan Phoenix: A Laboratory for Interdisciplinary Study" by Charles L. Redman highlights historical, demographic, and socio-economic factors in urbanization and its effects on agricultural land, biodiversity, and human-environment nutrient flows, demonstrating the importance of integrating multiple scales in studies of human and natural systems. "Patterns of Urban Land Use as Assessed by Satellite Imagery: An Application to Cairo, Egypt" by John R. Weeks, Dennis P. Larson, and Debbie L. Fugate develops an "urban index" through the use of remote sensing to pick up signals that can be used to estimate the percent of land surface that is impervious to water (e.g., pavement and buildings).

Two papers examine population-land use relations at the national level in Asia. "A Review of 10 Years of Work on Economic Growth and Population Change in Rural India" by Andrew Foster matches survey data from several thousand households across India between 1971 and 1999 with concomitant satellite data. Research suggests that continued high fertility, population growth, and increased road access accompanied modest but notable reforestation, which was enabled by agricultural intensification and attendant enhancement of agricultural yields. "Global and Case-Based Modeling of Population and Land Use Change" by Gunther Fischer and Brian C. O'Neill asks the important question of how case study research can best inform global analyses, concluding that spatially explicit analyses at a large regional scale are most suitable.

"Beyond Population Size: Examining Intricate Interactions Among Population Structure, Land Use, and Environment in Wolong Nature Reserve, China" by Jianguo Liu et al. addresses a socio-political conundrum facing protected areas throughout the world: How can policies mitigate human impacts on ecological systems? The authors suggest that relocating young people out of the Wolong Nature Reserve is more socially acceptable than relocating other groups, while also being more ecologically effective and economically efficient.

"People, Land Use, and Environment in the Yaqui Valley, Sonora, Mexico" by Pamela Matson et al. presents cross-disciplinary work incorporating land-use and management decisions from the bio-geochemical cycle to farmers' decision-making processes. The project pioneers the combination of various scales and data sources within a vulnerability and resilience framework. Another study on farming systems, "Population and Environment in the U.S. Great Plains" by Myron P. Gutmann et al. uses county-level data to investigate rural population change, cropland expansion, and soil chemistry changes across the U.S. farm belt during the past century.

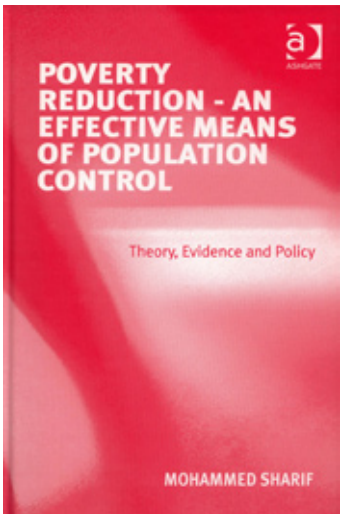
While each study incorporates elements of the panel's research agenda, they incompletely integrate social and natural sciences across temporal and spatial scales. The studies are all missing a Meso-scale link between local and regional, economic and political land-use policies, proving that the field remains in its infancy. Nevertheless, the editors and researchers demonstrate the previous decade's remarkable progress and fruitful avenues for further growth. Challenges facing future research include linking social and environmental data, collecting data at the appropriate levels of resolution, comparing data across sites and time, and moving from descriptive studies to those that can reasonably find causality. Moreover, even in

The conversion of forests to agriculture by rural people still leaves the largest human footprint on the Earth's surface, with consequences both injurious and benevolent.

light of recent strides, interdisciplinary collaboration remains a challenge.

Climate change has emerged as the topic *du jour*, and human population and land-use interactions are both major causes of greenhouse gases and viable avenues for their reduction. At a time when urbanization and aging have replaced rural population growth and youthful population structures as the most-discussed demographic trends of the new millennium, the demands of rural population change and urban consumption on rural systems remain the primary drivers of land-use change. As research agendas shift towards climate change, human vulnerability, urbanization, and aging, the conversion of forests to agriculture by rural people still leaves the largest human footprint on the Earth's surface, with consequences both injurious and benevolent. The improved understanding of the connection between human activity and environmental concerns demonstrated in *Population, Land Use, and the Environment,* which synthesizes more than a decade of population-land use research, is both exciting and daunting.

Poverty Reduction: An Effective Means of Population Control



By Mohammed Sharif
London: Ashgate, 2007. 184 pages.

Reviewed by RACHEL NUGENT

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Population policy in developing countries has long been a controversial topic, not least because the vast amount of research devoted to understanding the key determinants of fertility behavior has been inconclusive. In addition, because population raises sensitive and ideological issues, population policy has been mired in political debates. The combination of slow progress in both the research and policy spheres on the role of population growth in development, and what governments should do to influence that growth, has pushed this crucial topic to the sidelines of most of the important development discussions of our day.

Fertility decisions are driven by a complicated set of social, economic, cultural, and technological conditions that are difficult to sort out. Government policy may be a minor influence on the fertility component of population growth, but in some places and times it can be an important agent of change, even simply by changing decisions at the margin. However, it is not easy to measure the impact of government policy—or any other factors—on fertility. Therefore, research has been sometimes contradictory, sometimes inconclusive, and the strongest results are highly site- and program-specific (see, e.g., Robinson & Ross, 2007; Schultz, 1997). In *Poverty Reduction: An Effective Means of Population Control,* Mohammed Sharif attempts to use both theoretical and empirical analysis to take a fresh look at the topic. Unfortunately, the book is contradictory and inconclusive—and certainly not fresh.

Until very recently, policy advocates and researchers seemed to agree that high rates of