1982

The Human Settlements and Services Area

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SR–83–1
January 1983

INTERNATIONAL INSTITUTE
FOR APPLIED SYSTEMS ANALYSIS
Laxenburg, Austria

PREFACE

This status report is the last of a series initiated in January 1979 to review work of the Human Settlements and Services Area at IIASA for the Area's Advisory Committee (the members of which are listed in the Appendix). The 1982 review briefly describes major events that occurred during the year and lists all publications issued during that period. A separate section sets out the abstracts of the Research Reports. The status report ends with brief biographies of those scientists who were with the Area for longer than a month.

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INTRODUCTION

During 1982, the final year of its existence, the Human Settlements and Services (HSS) Area at IIASA finished its study of migration and settlement patterns in the Institute's 17 member countries and ended its investigations of the interrelations between economic development, demographic change, and settlement structure. Work on public facility location modeling and on health care systems planning was concluded, and a capstone conference reviewing the latter was held in Moscow at the end of the year. Due to the transformation of the Institute's research program that occurred in 1982, the study of housing and transportation was never initiated and work on manpower analysis was aborted. The Area's research activities were reported in 3 special issues of international journals (a fourth has a 1981 date but was published in 1982), 1 book, 14 Research Reports, 1 Collaborative Publication, 1 Status Report, and 26 Papers, which appeared during the year. Involved in these activities were the 18 scholars from 11 countries who were in residence for periods of one month or longer and the much larger number who visited the Area for shorter periods of time.

MAJOR EVENTS

Spatial Choice Models Workshop

A fundamental problem in the study of human geography is understanding and predicting how people choose among spatially distributed alternatives. The introduction of the spatial dimension can contribute to shortages, competition, and congestion. To examine these and other related interrelationships the HSS Area convened an international workshop on spatial choice models from 29 March to 1 April 1982. Recent advances in the field were presented and critically evaluated. Directions for future research were charted, and an international community of scholars was organized as a starting point for future collaborative work on the topics addressed by the workshop participants.

Multiregional Demography at the 1982 PAA Meeting

One of the central activities of the HSS Area during the past several years has been the development of multiregional mathematical demography—the study of spatial human population dynamics. The model has been used not only for the investigation of migrations between regions (multiregional) but also for the analysis of transitions between states of existence (multistate or multidimensional).

The Annual Meeting of the Population Association of America, held in San Diego, California, on 29 April to 1 May, 1982, included in its agenda the first-ever session on multiregional demography. The session, chaired by Andrei Rogers, contained four papers dealing with applications of the multiregional

model and a discussion by Philip Rees of Leeds University, England. The four papers and their authors were:

1. *Migration and Settlement: A Multiregional Comparative Study*, A. Rogers, IIASA, F. Willekens, NIDI (Netherlands Interuniversity Demographic Institute), the Netherlands, and J. Ledent, INRS (Institut National de la Recherche Scientifique), Canada.

2. *Operational Multiregional Demography in Developing Countries: An Application to Thailand*, W. Doeve, Department of Town and Regional Planning, University of Sheffield, England.

3. *Projecting City-Suburb Population Redistribution within US SMSAs: An Extension of the Multiregional Methodology to the Intraregional Case*, W. Frey, Population Studies Center, University of Michigan, USA.

4. *Marriage, Divorce, and Remarriage from Retrospective Data: A Multiregional Approach*, T. Espenshade, The Urban Institute, Washington, D.C., USA.

Multistate Life-History Analysis Task Force Meeting

The concern with population movements across a number of discrete states of existence (i.e., statuses) is a central element of several analytical methods developed within the social sciences. Two traditions of analysis have emerged. One, using demographic concepts and procedures, is macro-oriented and revolves around the analysis of life tables and projections. The other, merging sociological concepts with methods drawn from studies of stochastic processes, is micro-oriented and combines behavioral hypotheses about the effects of heterogeneity on transition rates with dynamic models of stochastic processes.

Multistate demography has brought the demographic tradition much closer to the sociological one and a merger of the two seems possible. Therefore, 20 scholars from a number of countries met in Laxenburg on 15-18 November 1982 to explore the possibility of integrated macro and micro multistate analyses in a number of substantive areas: migration, marriage and divorce, employment, and health. A number of innovative papers were presented, generating several lively debates.

Moscow-HSS Health Care Conference

HSS and the National Member Organization of the USSR, with the collaboration of the Soviet Ministry of Health, convened a conference on health care in Moscow on 1-3 December 1982. The conference served as a capstone for past research and also explored potential collaboration on several topics that relate

to future research at IIASA. It brought together scholars from East and West who are interested in social security and disability issues, health economics and the health care needs of the elderly, strategies for the control of infectious diseases, and biometric analyses of medical life histories.

Inauguration of the POPNET Newsletter

During the past several years, research on population-related topics in the HSS Area has involved an ever-growing family of international scholars in demography, geography, economics, planning, sociology, engineering, and other disciplines. As this family grows, it becomes increasingly difficult to maintain contact with all of its members. Moreover, a significant number of HSS alumni are continuing to carry out IIASA-related work at their home institutions, occasionally visiting Laxenburg for a week or more to exchange new research findings. Interlinking the efforts of this network of collaborating scholars and disseminating their results to the wider IIASA family of alumni suggested a need for an informal newsletter.

The POPNET newsletter was established in 1982 to report on the activities of members of this international collaborative network of scholars who share a common understanding and have a common goal: the advancement of knowledge needed for dealing with issues arising out of different patterns of population change, urbanization, and development. The first two issues were published in 1982.

Publication of Three Special Journal Issues on Urbanization and Development

The urbanization and development research activities of the HSS Area were the focus of three international journals in 1982. The April 1982 issue of *Economic Development and Cultural Change*, edited by Andrei Rogers and Jeffrey Williamson, addresses Third-World urbanization and development patterns and includes a number of papers authored by current or past HSS scholars. In addition to an overview paper by the editors, IIASA research is reported in papers by J. Ledent, A. Kelley and J. Williamson, N. Keyfitz, and A. Rogers.

The Fall issue of the Mexican journal *Demografia y Economia*, edited by Andrei Rogers, Luis J. Castro, and Roberto Ham, examines internal migration patterns, multiregional life table construction methods, urbanization processes, and the Mexican experience.

Finally, the October issue of *International Regional Science Review*, contains six papers prepared by HSS scholars for a June 1981 conference on urbanization and development. The papers, authored by U. Karlström, P. Korcelli, J. Ledent, E. Sheppard, H. Shishido, and M. Wegener, deal with patterns of migration

and urban settlement and include case studies of industrialization, urbanization, and development in nineteenth-century Sweden and twentieth-century Japan.

Publication of the Multidimensional Demography Conference Proceedings

Academic Press published the proceedings of a conference on multidimensional mathematical demography that was held at the University of Maryland on 23-25 March 1981. Co-organized by Kenneth Land of the University of Texas and Andrei Rogers of IIASA, and supported by a grant from the US National Science Foundation, the conference brought together mathematical demographers, sociologists, and statisticians to examine the emerging state-of-the-art of multidimensional demography.

Multidimensional demography, a new branch of formal demography, is concerned with the study of the evolution of populations that experience transitions over several states of existence during their lifetimes. Such transitions include movements between geographic regions and various employment and marital statuses, as well as the absorbing state of death into which all individuals eventually enter.

The proceedings volume contains a dozen chapters: an introductory overview essay and 11 chapters dealing with data problems, life tables, population dynamics, and heterogeneity. Seven of the 14 authors are IIASA scholars or alumni: L. Castro, J. Cohen, P. Kitsul, D. Philipov, J. Ledent, A. Rogers, and F. Willekens. (The book is available from Academic Press Inc., 111 Fifth Avenue, New York, New York 10003, USA.)

Completion of the Three-Volume Boxed Set on Migration and Settlement

In 1976 the HSS Area initiated a study of migration and settlement patterns in IIASA's 17 member nations. The analysis was carried out in each country by national scholars who used methods of multiregional demography developed by IIASA staff, implementing them with computer programs published in Research Report-78-18.

The last national case study, *Migration and Settlement: 17. Italy*, was published in September in time for IIASA's tenth anniversary celebration. The entire collection of reports has been assembled to form a special boxed set, including six research reports that present the study's models, methods, and computer programs and two special issues of *Environment and Planning A*, which describe results generated by this research project.

With the conclusion of the final case study, attention has now shifted to the drafting of a book that summarizes and integrates the various contributions and results produced by the Migration and Settlement Task. To be published by John Wiley as a volume in IIASA's State-of-the-Art Series, the book will be available next year.

Approval of the Population Program's Research Agenda

At its November meeting in Laxenburg, the IIASA Council formally approved a completely redesigned research agenda for the Institute. In 1983, Areas and Programs will be replaced by a new research structure that is organized around a set of ten programs. Some of the activities carried out in the HSS Area will be phased out, and others will find their new home in two programs: the Population Program and the Regional and Urban Development Program.

The Population Program will focus on the human factor in social development and will examine ways in which industrialized societies might adapt and respond to changes in population dynamics. It will examine current patterns of population aging and changing lifestyles in IIASA countries, project the needs for health and income support that such patterns are likely to generate during the next several decades, and consider alternative family and employment policies that might reduce the social costs of meeting these needs.

PUBLICATIONS

The published results of the Area's research have appeared as one of the following four types of publications, depending on the nature of the work and its intended audience.

The *International Series Book* is published as part of IIASA's *International Series on Applied Systems Analysis* by John Wiley and Sons. Individual monographs may be state-of-the-art surveys, leading examples of applied systems analysis, or contributions to the advancement of applied systems analysis. The series includes monographs resulting from IIASA work as well as monographs written by experts outside the Institute.

The *Research Report* (RR) is IIASA's formal vehicle for reporting Institute research after it has been carefully reviewed. The RR classification is used to report final results and interim or contributing work when these results are felt to merit broad circulation.

The *Collaborative Publication* or *Paper* (CP) is used to report both the proceedings of conferences and workshops and the results of research done jointly with other research organizations.

The *Working Paper* (WP) provides a means for the informal distribution of intermediate results to scientific colleagues within and outside the Institute.

All of the HSS Area's 1982 publications in these four categories are listed below.

Book

Computer Controlled Urban Transportation: A Survey of Concepts, Methods, and International Experiences
H. Strobel — John Wiley and Sons

This book is concerned with present and future traffic problems in cities in the developing and developed world. It examines possible solutions to those problems based on technological innovations and use of large-scale computerized traffic and transportation control systems. It discusses the basic concepts and methods for control and automation that have been proposed, developed, and implemented in various cities and nations.

Research Reports

Migration and Natural Increase in the Growth of Cities
(Reprinted from *Geographical Analysis* 13(4):287-299)
N. Keyfitz and D. Philipov — RR-82-2

Migration and natural increase are the two contributors to urban population growth. The complex question of which of the two is more important is analyzed in this article through the use of simulation techniques. Immediate effects are contrasted with long-run effects, and the age of the migrant is considered as an important factor, along with the crucial variable of rural population growth.

Two Essays on Alonso's Theory of Movement
(Reprinted from *Sistemi Urbani* 2(3):327-358 and *Environment and Planning A* 13:217-224)
J. Ledent — RR-82-4

The two essays republished in this report are part of the Urban Change Task's dissemination effort. They examine aspects of William Alonso's general theory of movement, developed over a decade ago. In them, Jacques Ledent argues that the Alonso model and one of Alan Wilson's well-known spatial-interaction models are equivalent formulations. A valuable contribution of these two essays is the development of a method for fitting the Alonso model to data on interregional migration.

DRAM: A Model of Health Care Resource Allocation in Czechoslovakia
(Reprinted from *OMEGA: The International Journal of Management Science* 9(5):509-518)
P. Aspden, L. Mayhew, and M. Rusnák RR-82-6

This paper presents an application to data from Czechoslovakia of a health care resource allocation model called DRAM (Disaggregated Resource Allocation Model). The model attempts to predict the consequences of resource-level changes, in terms of the numbers of patients treated in each clinical category and the quality of care they receive in each mode of treatment. In this application, seven acute clinical categories and two types of resources (hospital doctors and hospital beds) are selected for examination in one mode of treatment—in-patient care. Some parallels are drawn with a comparable application in the UK.

Public Facility Location: Issues and Approaches
(Reprinted from *Sistemi Urbani* 3:293-470)
G. Leonardi, Editor RR-82-23

The papers collected in this issue were presented at the Task Force Meeting on Public Facility Location, held at IIASA in June 1980. The meeting was an important occasion for scientists with different backgrounds and nationalities to compare and discuss differences and similarities among their approaches to location problems. Unification and reconciliation of existing theories and methods was one of the leading themes of the meeting, and the papers collected in this report are part of the raw material to be used as a starting point towards this aim.

Urbanization and Development in the Third World
(Reprinted from *Economic Development and Cultural Change* 30: 463-538, 595-623, 649-670)
A. Rogers and J. Williamson, Editors RR-82-24

During the past several years, the HSS Area has focused much of its research on population growth, structural change, and settlement dynamics. The five papers in this collection, written by current or past scholars in the Area, are a representative sample of this research. Together with three papers by other authors (not included in this report), they form the proceedings of a symposium on urbanization in the Third World published by the journal *Economic Development and Cultural Change*.

Simplified Multiple Contingency Calculations
(Reprinted from *The Journal of Risk and Insurance* 49:59-72)
N. Keyfitz and A. Rogers RR-82-30

Standard life contingency formulas are shown to have matrix analogues. The derivation of these multidimensional forms permits simple solutions to multiple contingency problems, including moves in and out of employment, insurance, marriage, sickness, and retirement. Awkward and inaccurate approximations now commonly used can thus be replaced by matrix formulas readily manipulated by computer.

Multidimensional Mathematical Demography: An Overview
(Reprinted from *Multidimensional Mathematical Demography*. New York: Academic Press)
K. Land and A. Rogers RR-82-35

Generalizations of the classical models of mathematical demography to include multiple states of existence in the course of the life cycle have appeared with increasing frequency during the past decade. The new methods for manipulating data, constructing life tables, and generating population projections have fostered innovative empirical studies of, for example, interregional migration, marriage and divorce, and labor force participation. And they have established a need for a systematic assessment of this growing body of research. Responding to this need, the authors of this essay convened a conference on multidimensional mathematical demography at the University of Maryland at College Park, Maryland, USA in March 1981. The essay reproduced in this reprint, written by the organizers of the conference, presents an overview of multidimensional demography and outlines the results of the conference. It appears as the introductory chapter of the conference proceedings volume just published by Academic Press.

Equity, Efficiency, and Accessibility in Urban and Regional Health-Care Systems
(Reprinted from *Environment and Planning A* 14:1479-1507)
L. Mayhew and G. Leonardi RR-82-47

This paper considers four different resource allocation criteria for assessing the long-term health resource requirements needed in different areas of a region. These criteria

are based on a spatial interaction model that provides a simple method for selecting between different configurations, when population size and structure and resource availability are changing over time and space. They reflect a concern with the improvement of the equity or efficiency of the system, or the accessibility of the population to the supply of health services.

Urbanization and Development: Selected Essays
(Reprinted from *International Regional Science Review* 7(2): 99-247)
A. Rogers, Editor RR-82-48

Scholars from a large number of nations have gathered at IIASA during the past several years to examine historical and current patterns of growth and change in national settlement systems. As a part of this research activity, in 1981 HSS held a conference on Urbanization and Development at which the diverse problems associated with rapid population growth and structural change, urban growth and decline, and the spatial concentration of national populations in large cities were discussed. The six papers collected in this report consider urbanization trends and city size distributions, demoeconomic models of economic and urban growth, and emerging patterns of migration and urban change.

Research Reports on the Comparative Migration and Settlement Study

This collection of national reports deals with the comparative analysis of internal migration and spatial population growth in the 17 National Member Organization countries of IIASA. Patterns of population change are explored by applying the new multiregional methodologies and computer programs elaborated in the HSS Area. All reports have the same structure and include multiregional data on fertility, mortality, and migration; multiregional life tables, spatial mortality, fertility, and migration expectancies; and multiregional population projections. Each Migration and Settlement report is authored by a native collaborating scholar familiar with the demographic setting of his/her country. (The first dozen reports were completed during the period 1979-1981.)

Collaborative Publications and Papers

Human Settlement Systems: Spatial Patterns and Trends
T. Kawashima and P. Korcelli, Editors CP-82-S1

The papers in this volume were originally presented at a conference on the analysis of human settlement systems held at IIASA from 18-20 October 1978. This meeting closed a IIASA research activity, started in 1975, that had the goals of identifying functional urban regions in several industrialized countries and making comparative analyses of their population and employment trends to enhance our understanding of the spatial and temporal evolution of human settlement systems.

A Concept of Modeling a Health Manpower Educational System
M. Bojańczyk and W. Rokicki CP-82-3

Sectoral Change and Interregional Mobility: A Simulation Model of Regional Demoeconomic Development in North Rhine-Westphalia
C. Schönebeck CP-82-10

Regional Mortality Differentials in IIASA Nations
M. Termote CP-82-28

Marriage, Divorce, and Remarriage from Retrospective Data: A Multiregional Approach
T. Espenshade CP-82-34

A Multiregional Population Projection Framework That Incorporates Both Migration and Residential Mobility Streams: Application to Metropolitan City-Suburb Redistribution
W. Frey CP-82-55

The IIASA Health Care Allocation Model DRAM: Calibration Using Data from Poland
M. Bojańczyk CP-82-61

The Quadratic Transportation Problem as a Model of Interregional Migration Patterns
W. Tobler CP-82-84

Working Papers

The Role of Emigration and Migration in Swedish Industrialization —Some Preliminary Results Using a Computable General Equilibrium Model
U. Karlström WP-82-4

Economic Growth and Labor Market Dualism: A Preliminary Study of the Japanese Case
H. Shishido WP-82-7

A Multistate Manpower Projection Model
M. Pelling WP-82-12

Population and Employment in China
N. Keyfitz WP-82-14

Aspects of Urban Decline: Experiments with a Multilevel Economic-Demographic Model for the Dortmund Region
M. Wegener WP-82-17

On the Geometry of Emergency Service Medical Provision in Cities
G. Hyman and L. Mayhew WP-82-23

City Size Distributions and Spatial Economic Change
E. Sheppard WP-82-31

Global Prospects for Population Growth and Distribution
N. Keyfitz with the collaboration of P. Just WP-82-36

Can Theory Improve Population Forecasts?
N. Keyfitz WP-82-39

The Deviant Dynamics of Death in Heterogeneous Populations
J. Vaupel and A. Yashin WP-82-47

Multistate Demography and Event History Analysis
M. Hannan WP-82-50

The Expected Number of Transitions from One State to Another: A Medico-Demographic Model
A. Yashin WP-82-57

A Framework for Multistate Demoeconomic Modeling and Projection, with an Illustrative Application
A. Rogers and P. Williams WP-82-69

Migration and Settlement: A Multiregional Comparative Study
A. Rogers, F. Willekens, and J. Ledent WP-82-85

Estimating Multiattribute Spatial Choice Models
M. Wegener and F. Graef WP-82-93

What the Age Composition of Migrants Can Tell Us
L. Castro and A. Rogers WP-82-94

Metropolitan Growth and Population Development at a National Level
P. Korcelli and P. Just WP-82-99

IIASA's Population Project: Aging and Changing Lifestyles
A. Rogers WP-82-112

Parametrized Multistate Population Dynamics
A. Rogers WP-82-125

THE RESEARCH STAFF

Eighteen research scholars were members of the HSS Area in 1982 for contract periods lasting at least one month. Together with the much larger number of short-term visiting scholars, they brought to the Area a wide variety of disciplinary skills, cultural backgrounds, and national perspectives. The brief biographies listed below give an indication of the richness of this mixture.

Research Scholars

Luis Castro, Mexico (October 1977-March 1982), came to work with the HSS Area on the comparative study of migration and settlement patterns in IIASA countries and on a case study of Mexico's urbanization and development. Professor Castro received his civil engineering degree (1970) from the Universidad Nacional Autonoma de Mexico (UNAM) and his M.Sc. (1975) from the Urban Systems Engineering and Policy Planning Program at Northwestern University, Illinois. In Mexico, he was a professor at the Graduate School of Civil Engineering at UNAM and a project leader for a consulting firm.

Michael Hannan, USA (November 1981-August 1982), came to IIASA to work on the Manpower Task in HSS as well as on the Organizational Innovation Task in the Management and Technology Area. He is a professor of sociology and director of the Organization Studies Section of the Institute for Mathematical Studies in the Social Sciences at Stanford University. Professor Hannan received both his M.A. and Ph.D. degrees in sociology from the University of North Carolina at Chapel Hill. His current research focuses on the ecology of organizations and models

and methods for analyzing social processes. He recently completed a large-scale evaluation of the impact of income maintenance experiments on marriage and family relations.

Peer Just, FRG (October 1981-), joined HSS to work on multiregional demography. He studied computer science and statistics at the University of Vienna and obtained his Master's degree from there. In 1981 he received his Ph.D. from the same university after having completed his dissertation on theoretical extensions of multidimensional demography and its possible applications. Dr. Just's current research focuses on urban-rural population projections and multistate demography; he is developing a computer program, based on this theoretical work, that will enable one to project the urban and rural populations for all UN-member countries.

Pavel Kitsul, USSR (December 1977-February 1982), a research scholar at the Institute of Control Sciences of the USSR Academy of Sciences since 1970, came to IIASA to participate in the Health Care Systems Task. Dr. Kitsul received his Ph.D. in physics and mathematics (1973) from the Moscow Institute of Physics and Technology. His scientific interests include the theory and application of stochastic processes, and identification and control in complex systems.

Piotr Korcelli, Poland (June 1979-December 1982), was associated with the HSS Area since October 1975, working at IIASA for short periods of time until 1979. He is currently on leave from the Institute of Geography and Spatial Organization of the Polish Academy of Sciences, where he heads the Department of Urban and Population Studies. Dr. Korcelli received his Ph.D. in economic geography (1968) from the Polish Academy of Sciences and a Habilitation Doctorate in 1973. In 1963-1964 he was a research assistant at the University of Maryland.

Giorgio Leonardi, Italy (October 1979-December 1982), joined HSS to work on problems of normative location modeling. Dr. Leonardi received his Ph.D. from the Polytechnic Institute of Milan, Faculty of Architecture, in 1969. On leave from the Polytechnical Institute of Turin, his research has focused on activity location-allocation models, optimal multifacility models, and dynamic spatial interaction models.

Leslie Mayhew, UK (March 1980-June 1982), came to the Health Care Systems Task from the Department of Health and Social Security in London. He received his Ph.D. in geography from Birkbeck College, University of London (1979). At the Department of Health and Social Security, Dr. Mayhew was involved in the mathematical modeling of the interaction between the supply and demand for acute hospital services in the London region. Dr. Mayhew's scientific interests include regional science, econometric methods, and computing.

Klaus Neusser, Austria (January 1981-), is a part-time research scholar in the HSS Area working on labor supply questions. Mr. Neusser received his diploma in applied mathematics and economics from the Technical University of Vienna in 1978. He is currently on the staff of the Economics Department of the Institute for Advanced Studies in Vienna, where he teaches monetary theory. He recently completed research on the application of portfolio theory to the financial investments of insurance companies. Mr. Neusser's scientific interests include macroeconomics, econometrics, and monetary economics.

Dimiter Philipov, Bulgaria (September 1977-September 1982), came to the HSS Area from the Scientific Institute of Statistics at Sofia. Mr. Philipov studied mathematics, mathematical statistics, and probability theory at the University of Sofia. His scientific interests include the mathematics of population growth and demoeconomics. At IIASA, he concentrated on comparative studies of migration and settlement patterns.

Edward Rising, USA (January-August 1982), joined the Health Care Task from the Department of Industrial Engineering and Operations Research, University of Massachusetts, where he has been since 1960. Professor Rising studied mechanical engineering at Rensselaer Polytechnic Institute and Syracuse University and received his Ph.D. in industrial and management engineering in 1959 from the State University of Iowa. His current scientific interests include the application of systems analysis to the delivery of health and medical care.

Andrei Rogers, USA (July 1975-), has led the HSS Area at IIASA since 1976. Professor Rogers received his bachelor's degree in architecture (1960) from the University of California at Berkeley and his Ph.D. in urban and regional planning (1964) from the University of North Carolina at Chapel Hill. Since then he has been a professor in the City and Regional Planning Department at the University of California at Berkeley and the Technological Institute at Northwestern University, Illinois. His current research focuses on migration, the evolution of human settlement systems in both developed and developing countries, and population aging.

Warren Sanderson, USA (January, June-August 1982), returned to IIASA to continue his work on two-sex marriage models and work jointly with the System and Decision Sciences Area on topics related to education. Dr. Sanderson received his Ph.D. in economics in 1974 from Stanford University, California and has since worked with the National Bureau of Economic Research, New York, and at Stanford University. He is now an associate professor at the State University of New York at Stony Brook. Dr. Sanderson's scientific specializations are in economic history, demography, and models of household decision making.

Eric Sheppard, UK (October 1981-December 1982), is an associate professor in the Department of Geography at the University of Minnesota where he teaches economic and urban geography and geographical analysis. He came to IIASA to work in the Urban Change Task on settlement system geography. Dr. Sheppard began his studies in geography at Bristol University and continued at the University of Toronto, Canada, where he received both his M.A. (1974) and his Ph.D. (1976). He is currently involved in research on the modeling of dynamic interdependencies in urban and regional systems.

Hisanobu Shishido, Japan (April 1981-), a research scholar in the Population, Resources, and Growth Task, studied social sciences at Hitotsubashi University, Tokyo. In 1978 he entered the joint Ph.D. program of the Department of Economics and the Department of Urban Studies and Planning at the Massachusetts Institute of Technology, Boston. His research interests lie in integrated rural and regional development planning, urban and regional economics, and macrodevelopment economics; he has just completed a general equilibrium demoeconomic model for Japan.

Nancy Tuma, USA (September-December 1982), is a part-time research scholar in the HSS Area, as well as a visiting professor at the Stanford University Vienna campus, on leave from the Department of Sociology at Stanford University, California. Professor Tuma studied mathematics and chemistry at Cornell University and received her Ph.D. in sociology from Michigan State University in 1972. Her interests include methodology and mathematical models of social processes, stratification and social mobility, demography, marriage and family, work and economics, public policy analysis, social networks, and urban sociology.

Michael Wegener, FRG (February-July 1982), joined the HSS Area to work on an FRG case study in the Urban Change Task. Dr. Wegener received his Ph.D. in Architecture and Urban Planning from the Institute of Technology, Aachen, in 1977, after which he joined the Institute of Urban and Regional Planning in Dortmund, where he is currently employed. His research interests focus on spatial models of urban and regional systems, in particular land-use/transportation and housing market models, and he has written a number of articles on planning theory, planning methods, and computer-aided techniques for urban planning.

Anatoli Yashin, USSR (September 1981-), came to IIASA from the Institute of Control Sciences, of the USSR Academy of Sciences, to work with the Health Care Systems Task. Dr. Yashin graduated from the Moscow Institute of Physics and Technology in 1967 and received his Ph.D. in physics and mathematics from the same institute in 1970. His scientific interests include the theory and application of stochastic processes, as well as identification and control in complex systems. He is the author of a number of papers on effective sequential estimation problems and on the socioeconomic aspects of health care planning.

Ernö Zalai, Hungary (August 1981-December 1982), came to IIASA to work on economic modeling in the HSS Area and the System and Decision Sciences Area. Dr. Zalai graduated from the Karl Marx University of Economics, Budapest (1966) with a specialization in mathematics and economic planning and received his Ph.D. from the same university in 1968. He was the head of the Planning Methodology Section in the Department of National Economic Planning and Management at Karl Marx University and acts as a consultant to the National Planning Office regarding the application of mathematical models to planning problems.

Research Assistant

Planck, Friedrich	FRG	November 1981 -

APPENDIX: The Human Settlements and Services Area's International Advisory Committee

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