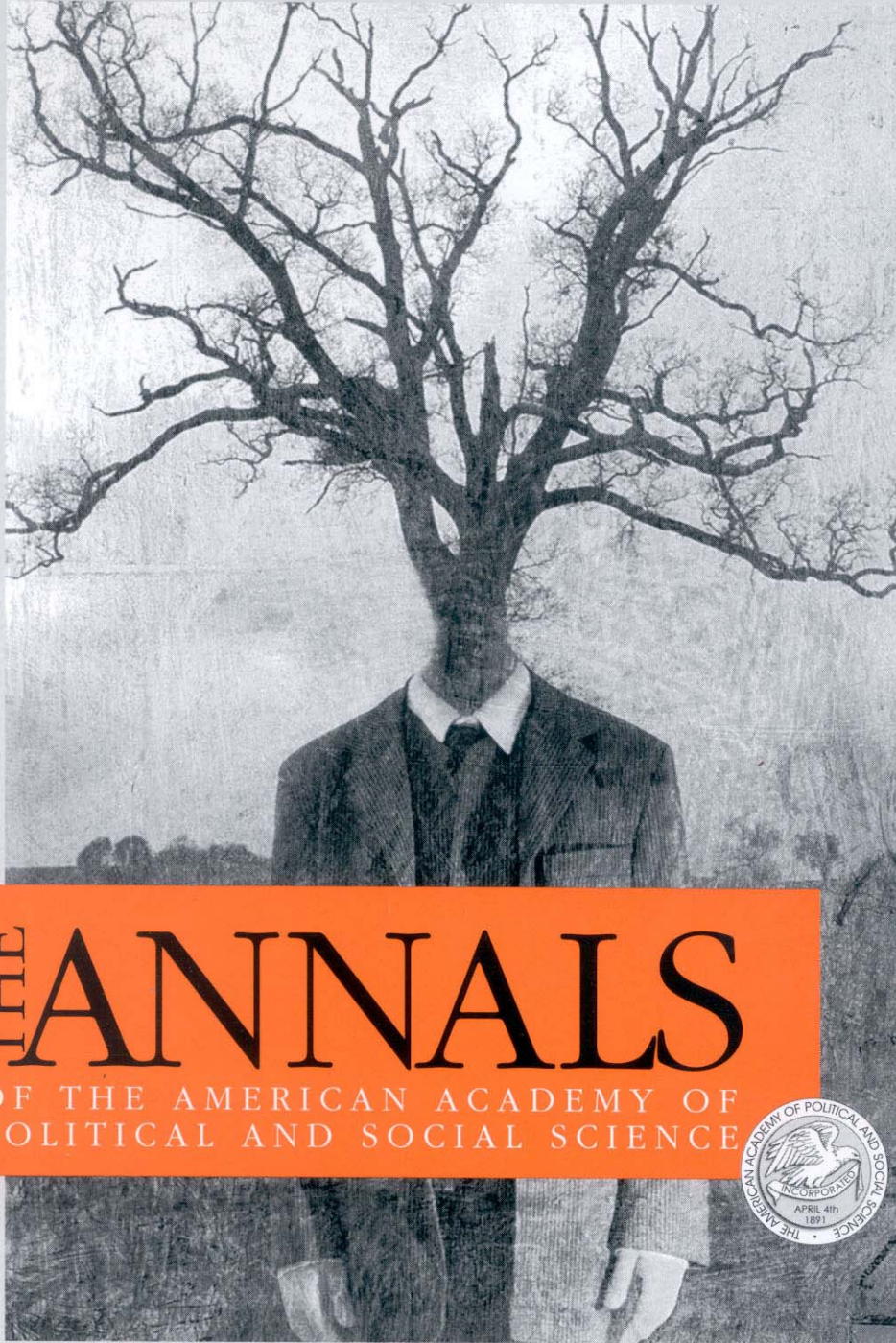


Rethinking Sustainable Development

*Special Editor: Jude L. Fernando*



# THE ANNALS

OF THE AMERICAN ACADEMY OF  
POLITICAL AND SOCIAL SCIENCE



Volume 590 November 2003

VOLUME 590

NOVEMBER 2003

# THE ANNALS

of The American Academy of Political  
and Social Science

ROBERT W. PEARSON, *Executive Editor*  
ALAN W. HESTON, *Editor*



## *Rethinking Sustainable Development*

Special Editor of this Volume

JUDE L. FERNANDO  
*University of Arizona*

SAGE Publications  Thousand Oaks • London • New Delhi

The American Academy of Political and Social Science  
3814 Walnut Street, Fels Institute of Government, University of Pennsylvania,  
Philadelphia, PA 19104-6197; (215) 746-6500; (215) 898-1202 (fax); www.aapss.org

*Board of Directors*

LAWRENCE W. SHERMAN, *President*

JAROSLAV PELIKAN, *Chair*

ELIJAH ANDERSON	SARA MILLER McCUNE
STEPHEN B. BURBANK	MARY ANN MEYERS
HEIDI HARTMANN	KLAUS NAUDÉ
JERRY LEE	NELL IRVIN PAINTER
JANICE FANNING MADDEN	LOUIS H. POLLAK

*Editors, THE ANNALS*

ROBERT W. PEARSON, *Executive Editor*

ALAN W. HESTON, *Editor*

RICHARD D. LAMBERT, *Editor Emeritus*

JULIE ODLAND, *Managing Editor*

**Origin and Purpose.** The Academy was organized December 14, 1889, to promote the progress of political and social science, especially through publications and meetings. The Academy does not take sides in controverted questions, but seeks to gather and present reliable information to assist the public in forming an intelligent and accurate judgment.

**Meetings.** The Academy occasionally holds a meeting in the spring extending over two days.

**Publications.** THE ANNALS of The American Academy of Political and Social Science is the bimonthly publication of the Academy. Each issue contains articles on some prominent social or political problem, written at the invitation of the editors. Also, monographs are published from time to time, numbers of which are distributed to pertinent professional organizations. These volumes constitute important reference works on the topics with which they deal, and they are extensively cited by authorities throughout the United States and abroad. The papers presented at the meetings of the Academy are included in THE ANNALS.

**Membership.** Each member of the Academy receives THE ANNALS and may attend the meetings of the Academy. Membership is open only to individuals. Annual dues: \$71.00 for the regular paperbound edition (clothbound, \$108.00). For members outside the U.S.A., add \$24.00 for shipping of your subscription. Members may also purchase single issues of THE ANNALS for \$21.00 each (clothbound, \$29.00). Student memberships are available for \$49.00.

**Subscriptions.** THE ANNALS of The American Academy of Political and Social Science (ISSN 0002-7162) (J295) is published six times annually—in January, March, May, July, September, and November—by Sage Publications, 2455 Teller Road, Thousand Oaks, CA 91320. Telephone: (800) 818-SAGE (7243) and (805) 499-9774; FAX/Order line: (805) 499-0871. Copyright © 2003 by The American Academy of Political and Social Science. Institutions may subscribe to THE ANNALS at the annual rate: \$454.00 (clothbound, \$513.00). Add \$24.00 per year for subscriptions outside the U.S.A. Institutional rates for single issues: \$88.00 each (clothbound, \$98.00).

Periodicals postage paid at Thousand Oaks, California, and at additional mailing offices.

Single issues of THE ANNALS may be obtained by individuals who are not members of the Academy for \$33.00 each (clothbound, \$46.00). Single issues of THE ANNALS have proven to be excellent supplementary texts for classroom use. Direct inquiries regarding adoptions to THE ANNALS c/o Sage Publications (address below).

All correspondence concerning membership in the Academy, dues renewals, inquiries about membership status, and/or purchase of single issues of THE ANNALS should be sent to THE ANNALS c/o Sage Publications, 2455 Teller Road, Thousand Oaks, CA 91320. Telephone: (800) 818-SAGE (7243) and (805) 499-9774; FAX/Order line: (805) 499-0871. *Please note that orders under \$30 must be prepaid.* Sage affiliates in London and India will assist institutional subscribers abroad with regard to orders, claims, and inquiries for both subscriptions and single issues.

---

*Printed on recycled, acid-free paper*

---

# THE ANNALS

© 2003 by The American Academy of Political and Social Science

---

All rights reserved. No part of this volume may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from the publisher. All inquiries for reproduction or permission should be sent to Sage Publications, 2455 Teller Road, Thousand Oaks, CA 91320.

Editorial Office: 3814 Walnut Street, Fels Institute for Government, University of Pennsylvania, Philadelphia, PA 19104-6197.

For information about membership<sup>o</sup> (individuals only) and subscriptions (institutions), address:  
Sage Publications  
2455 Teller Road  
Thousand Oaks, CA 91320

Sage Production Staff: Scott F. Locklear, Matthew Adams, and Paul Doebler

From India and South Asia,  
write to:  
SAGE PUBLICATIONS INDIA Pvt Ltd  
B-42 Panchsheel Enclave, P.O. Box 4109  
New Delhi 110 017  
INDIA



From Europe, the Middle East,  
and Africa, write to:  
SAGE PUBLICATIONS LTD  
6 Bonhill Street  
London EC2A 4PU  
UNITED KINGDOM

<sup>o</sup>Please note that members of the Academy receive THE ANNALS with their membership.

International Standard Serial Number ISSN 0002-7162

International Standard Book Number ISBN 0-7619-2859-6 (Vol. 590, 2003 paper)

International Standard Book Number ISBN 0-7619-2860-X (Vol. 590, 2003 cloth)

Manufactured in the United States of America. First printing, November 2003.

The articles appearing in *The Annals* are abstracted or indexed in Academic Abstracts, Academic Search, America: History and Life, Asia Pacific Database, Book Review Index, CAB Abstracts Database, Central Asia: Abstracts & Index, Communication Abstracts, Corporate ResourceNET, Criminal Justice Abstracts, Current Citations Express, Current Contents: Social & Behavioral Sciences, e-JEL, EconLit, Expanded Academic Index, Guide to Social Science & Religion in Periodical Literature, Health Business FullTEXT, HealthSTAR FullTEXT, Historical Abstracts, International Bibliography of the Social Sciences, International Political Science Abstracts, ISI Basic Social Sciences Index, Journal of Economic Literature on CD, LEXIS-NEXIS, MasterFILE FullTEXT, Middle East: Abstracts & Index, North Africa: Abstracts & Index, PAIS International, Periodical Abstracts, Political Science Abstracts, Psychological Abstracts, PsycINFO, Sage Public Administration Abstracts, Social Science Source, Social Sciences Citation Index, Social Sciences Index Full Text, Social Services Abstracts, Social Work Abstracts, Sociological Abstracts, Southeast Asia: Abstracts & Index, Standard Periodical Directory (SPD), TOPICsearch, Wilson OmniFile V, and Wilson Social Sciences Index/Abstracts, and are available on microfilm from University Microfilms, Ann Arbor, Michigan.

Information about membership rates, institutional subscriptions, and back issue prices may be found on the facing page.

**Advertising.** Current rates and specifications may be obtained by writing to *The Annals* Advertising and Promotion Manager at the Thousand Oaks office (address above).

**Claims.** Claims for undelivered copies must be made no later than six months following month of publication. The publisher will supply missing copies when losses have been sustained in transit and when the reserve stock will permit.

**Change of Address.** Six weeks' advance notice must be given when notifying of change of address to ensure proper identification. Please specify name of journal. POSTMASTER: Send address changes to: *The Annals* of The American Academy of Political and Social Science, c/o Sage Publications, 2455 Teller Road, Thousand Oaks, CA 91320.



# THE ANNALS

OF THE AMERICAN ACADEMY OF  
POLITICAL AND SOCIAL SCIENCE

Volume 590

November 2003

IN THIS ISSUE:

## *Rethinking Sustainable Development*

Special Editors: JUDE L. FERNANDO

- Preface: The Power of Unsustainable  
Development: What Is to Be Done? . . . . . *Jude L. Fernando* 6
- Toward Just Sustainability in Urban  
Communities: Building Equity Rights  
with Sustainable Solutions . . . . . *Julian Agyeman  
and Tom Evans* 35
- NGOs and Production of Indigenous  
Knowledge under the Condition  
of Postmodernity . . . . . *Jude L. Fernando* 54
- The Links between Poverty and the  
Environment in Urban Areas of Africa,  
Asia, and Latin America . . . . . *David Satterthwaite* 73
- Chiang Mai and Khon Kaen as Growth Poles:  
Regional Industrial Development in  
Thailand and Its Implications  
for Urban Sustainability . . . . . *Jim Glassman  
and Chris Sneddon* 93
- Sustainable Development and Urban Growth  
in the Argentine Pampas Region . . . . . *Jorge Morello,  
Silvia Diana Matteucci,  
and Andrea Rodríguez* 116
- Poverty, Sustainability, and the Culture  
of Despair: Can Sustainable Development  
Strategies Support Poverty Alleviation  
in America's Most Environmentally  
Challenged Communities? . . . . . *Amy K. Glasmeier  
and Tracey L. Farrigan* 131

Environmental Activism and Social Networks: Campaigning for Bicycles and Alternative Transport in West London . . . . .	<i>Simon Batterbury</i>	150
Urbanization and the Politics of Land in the Manila Region. . . . .	<i>Philip F. Kelly</i>	170
Neoliberalism and Nature: The Case of the WTO . . . . .	<i>Elaine Hartwick and Richard Peet</i>	188
NGOs, Organizational Culture, and Institutional Sustainability. . . . .	<i>David Lewis</i>	212
The Paradox of Sustainability: Reflections on NGOs in Bangladesh . . . . .	<i>Joseph Devine</i>	227
An Innovative Combination of Neoliberalism and State Corporatism: The Case of a Locally Based NGO in Mexico City . . . . .	<i>Roger Magazine</i>	243

FORTHCOMING

*Hope, Power, and Governance*

Special Editor: VALERIE BRAITHWAITE

Volume 591, January 2004

*Positive Youth Development*

Special Editor: CHRISTOPHER PETERSON

Volume 592, March 2004

*To Better Serve and Protect: Improving Police Practices*

Special Editor: WESLEY G. SKOGAN

Volume 593, May 2004

*Fieldwork Encounters and Ethnographic Discoveries*

Special Editor: ELIJAH ANDERSON

Volume 594, July 2004

# Sustainable Development and Urban Growth in the Argentine Pampas Region

By  
JORGE MORELLO,  
SILVIA DIANA  
MATTEUCCI,  
and  
ANDREA RODRÍGUEZ

This article describes the conflict between rural and urban development in the *Pampa Ondulada* (Rolling Pampas), the ecological region in which the city of Buenos Aires is located, which is one of the world's richest and most productive agricultural areas. It describes the ecological changes brought by urban growth in periurban and rural areas between 1869 and 1991. It also includes an analysis of the social and economical changes during the past decade (1991-2001) and their effect on ecological services. The article ends with a discussion of the lack of planning over the expansion process of the urban agglomeration, including the so-called suburbia settlements of the middle and upper classes and the speculative pricing of land in advance of its development.

*Keywords:* urban sprawl; regional sustainability; Buenos Aires; informal settlements; flooding

When urban sprawl encroaches on the most fertile agricultural lands of a country with no planning, the sustainability issue jumps to the

*Jorge Morello is a plant ecologist specializing in Latin American ecosystems. He has worked in applied ecology, inventories, evaluations of development programs and development of ecosystems liable to flooding, and arid lands. He holds a Ph.D. in natural sciences from the University of La Plata, Argentina. He was appointed Robert F. Kennedy Visiting Professor of Latin American Studies at Harvard University. He has published more than 110 articles, including "Convergent Evolution in Warm Desert Ecosystems" (1977) and "Estilos de Desarrollo y Medio Ambiente" (1980). He has been an advisor to the Argentine government, a United Nations agency consultant, and a member of the Executive Committee of the International Association of Ecology. He is a professor emeritus at Buenos Aires University and the senior researcher of the National Research Council.*

*Silvia Diana Matteucci, a biologist, is a graduate of the University of Buenos Aires, Argentina, with a Ph.D. from Duke University. She has worked in landscape and regional ecology since the 1970s, both in Venezuela and in Argentina. Presently, she is a researcher of the National Research Council of Argentina and a teacher at the Faculty of Architecture, Design, and Urban Planning at the University of Buenos Aires.*

*Andrea Rodríguez holds two degrees from the Philosophy and Literature Faculty of Buenos Aires University:*

DOI: 10.1177/0002716203256901

national level. This is the case in the Argentine Pampas region, where the mean target cannot be to achieve a sustainable city in isolation from its spatial and functional relation to its rural surroundings. Neither can we think of a sustainable agriculture without considering the international socioeconomic environment, which puts pressure on production technologies and commercialization of grain and meat produce, changing the internal socioeconomic status (Morello and Matteucci 1997). In this prospect, it is not easy to work out indicators of sustainable development for the Pampean region. More difficult is to propose a feasible plan for sustainable management; however, it is possible to identify those activities that are not sustainable and those combinations of land use that are environmentally sound.

Argentina's Pampean region situation is hopeless judging from the table of indicators produced by the Commission for Sustainable Development of the United Nations ([http://www.un.org/esa/sustdev/natlinfo/indicators/isdms2001/table\\_4.htm](http://www.un.org/esa/sustdev/natlinfo/indicators/isdms2001/table_4.htm)); during the past decade (from 1990), most of the indicators have changed for the worse, especially the percentage of the population living below the poverty line and the unemployment rate. All other relevant indicators, such as arable and permanent crop land area, area of urban formal and informal settlements, and percentage of total population living in coastal areas, depend on the poverty indicators, and even though the balance of trade in goods and services seems to be growing, poverty, unemployment, and urban migration will not decrease because the surplus has to be applied to canceling the foreign debt.

In spite of this situation, we believe that it is important to understand the relationships between urban growth and ecological changes in the fringe of cities in Argentina to be able to work out ameliorating actions to improve some of the social indicators at a local level. In this article, we describe some of the ecological changes brought by urban expansion of the metropolitan area<sup>1</sup> in periurban and rural areas between 1869 and 1991, the form that these have taken, the consequences of poverty increases during the 1990s on ecological services of the rural areas, and their bearing on other indicators of the Commission on Sustainable Development of the United Nations Organization (1995), especially on the economic and human loss due to natural disasters. We discuss the lack of planning and control over the continued expansion of the urban agglomeration, including that caused by the residential settlements now favored by middle- and upper-income groups, and the speculative parceling of land in advance of its development.

---

*geography teacher for secondary normal and special education and a licenciatura. She also obtained a postgraduate certificate in environmental sciences and environmental impact evaluation from Harvard University and Real Colegio Complutense, United States. She has been a member of the Landscape Ecology Group lead by Dr. J. Morello since 1993. She is currently a research and teaching assistant in the Faculty of Architecture, Design, and Urban Planning of Buenos Aires University. She is involved in research dealing with regional ecology in the metropolitan area of Buenos Aires. She is author or coauthor of twenty-four papers.*



## Fertile Lands of the Rolling Pampas

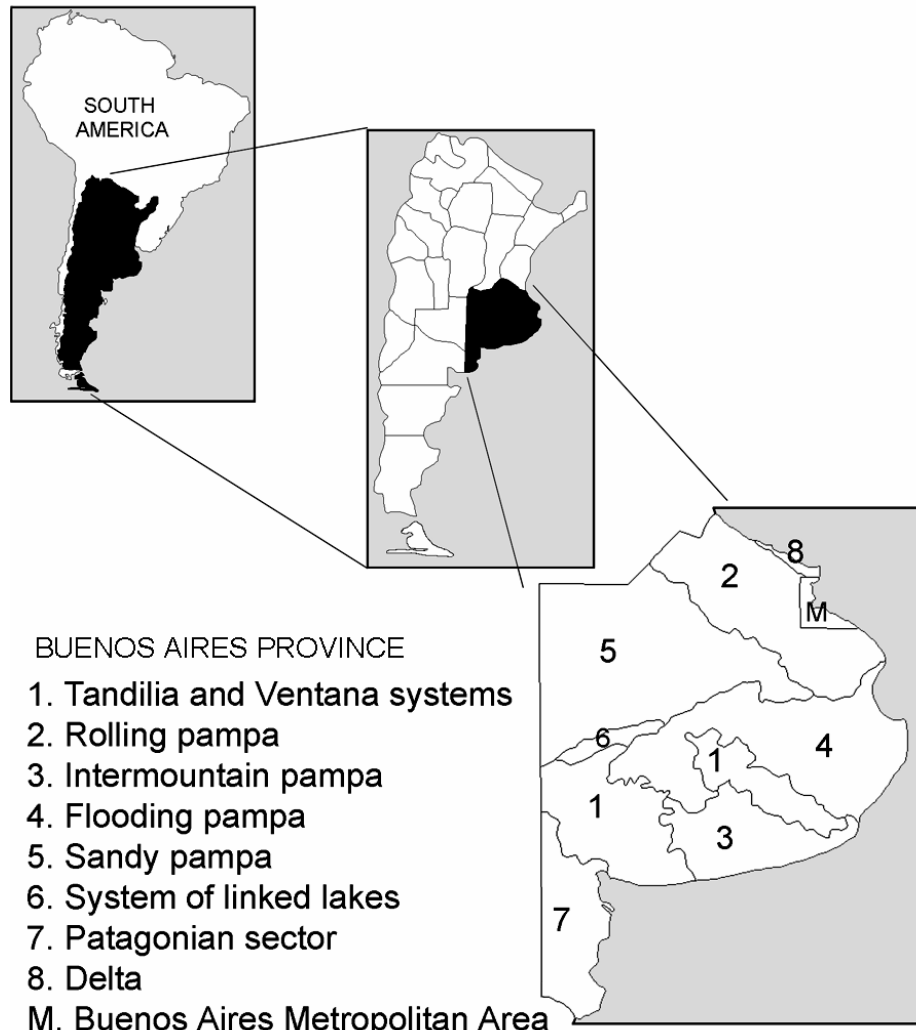
*La Pampa Ondulada*<sup>2</sup> (literally, the undulating or rolling Pampas) is one of the world's richest productive agricultural areas, and it occupies the central-eastern portion of the Province of Córdoba, north of Buenos Aires and southwest of Santa Fe (Secretariat of Agriculture, Livestock, and Fishery 1995). Its fertile soils, a low-energy relief, and widespread powerful aquifers (which have been intensively exploited to provide supplementary irrigation) have recently begun to provide an ideal medium for agricultural production. The region's climate is characterized by abundant annual precipitation (850-1,000 mm), which is distributed fairly uniformly throughout the year. The risk of frost is small; only for a short period of time do average monthly temperatures fall below 10 degrees Celsius. No snow falls in winter, so the same plot of land can be used to grow two or three crops each year. The ecoregion's agricultural wealth is attributable to its potential for alternate ranching with the cultivation of broadleaf (soy and sunflowers) and narrowleaf (wheat and maize) crops in space and time.

Average yields in this region show that this is the most richly endowed ecoregion of the Argentine Pampas in terms of cereal biomass per unit of area, and it accounts for the bulk of Argentina's export grain production (Scotta 1996). Slightly less than 400 kilometers of the rectangular Pampa Ondulada ecoregion (see Figure 1) border the Paraná River, where agroindustries and ports specializing in direct loading of grain, pellets, and oil onto transoceanic ships flourish. It also houses two of Argentina's major metropolitan areas, Buenos Aires and Rosario, which in 1991 had populations of 11.25 million and 1.09 million, respectively. These cities are part of the country's most important urban-industrial axis. In this moderately sized ecoregion of 44,000 square kilometers, competition between urban and rural land use is fierce. These two traditionally conflicting land uses assume uniquely dramatic proportions since the conflict is situated in Argentina's most important ecoregion for agricultural production in an agroexporting country and because the change from rural to urban use is a permanent one, as permanent as the extinction of a species.

The Buenos Aires metropolitan area (7,729 square km) is located on premium soil for agricultural production, with use capacities I through IV according to the classification of the U.S. Soil Conservation Service. The process of urban growth occurs at a biogeographic crossroads. This territory, whose geodesic center is the intersection of the 34°40' parallel and the 58°30' meridian, is home to interlocking ecosystems of biogeographic domains of wet tropical lineage, such as the Amazon, and seasonal tropical-subtropical ones, such as Chaqueño.

At this biogeographic crossroads, we find some woody species of tropical lineage, in the form of forests and savannas, with patches of landscape occupied by typical high-biodiversity jungle structures and low-diversity tropical riverside forests (Matteucci et al. 1999). Large areas of woody ecosystems, such as *Celtis spinosa* and *Prosopis alba*, and savannas of *Acacia caven* have disappeared where

FIGURE 1  
 MAP OF THE PROVINCE OF BUENOS AIRES WITH THE LOCATION  
 OF THE PAMPA ONDULADA AND ITS REGIONS



the land offered potential for agricultural use. Ever-shrinking patches of ecosystems, such as monospecific riverside forests of *Salix humboldtiana*, *Tessaria integrifolia*, high-diversity jungles of the Paraná Delta, and ridges of fertile land known as *monte blanco* and *selva marginal*, respectively, survive and are subjected to wet periods and flooding (Matteucci et al. 1999).

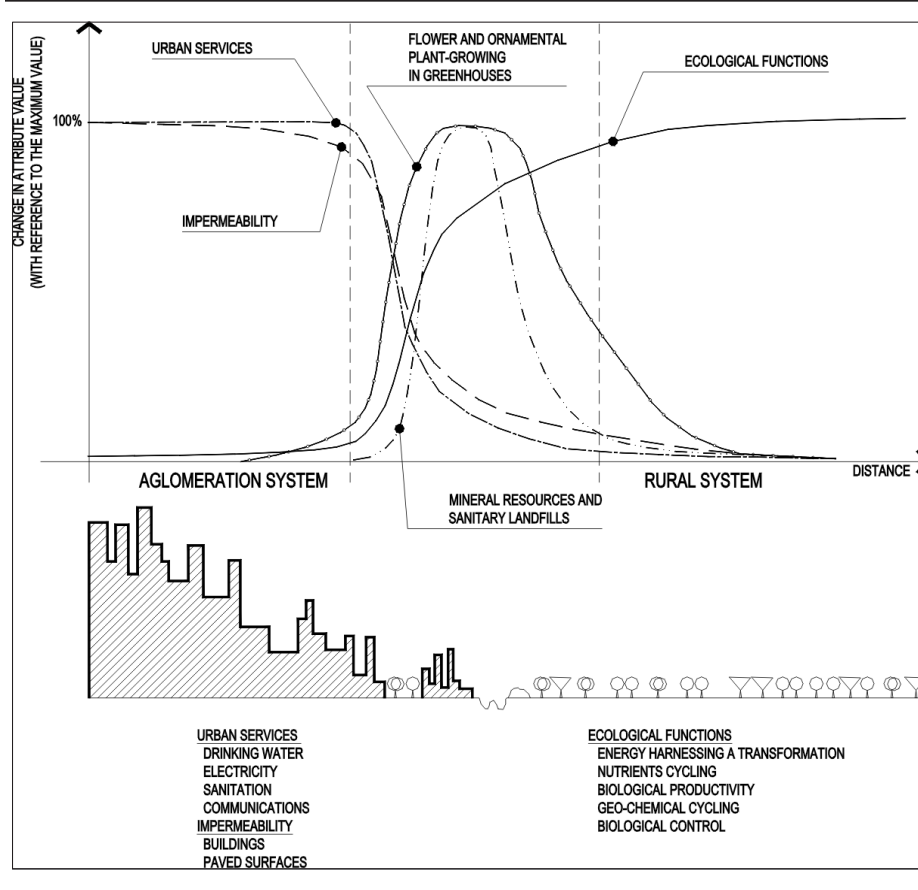
## Land Conversion in the Rolling Pampas Ecoregion

Since the second half of the 1940s, the Pampa Ondulada has been Argentina's most important area for the conversion of very high-quality agricultural land into urban-industrial land in the broadest sense, that is, including the landscape impression or footprint that urban agglomeration makes on its environment, with the exploitation of low-cost, heavy-weight natural resources (topsoil, B and C horizons, grass, turf, wood), and where transportation accounts for a substantial share of the costs. Urban agglomeration will be defined as the conversion of open land into city-block-sized lots, whether or not they are built on.

A distinction is drawn between a city's landscape footprint and what William E. Rees defines as its ecological footprint (Rees 1992). A city's landscape footprint includes the ecologically productive land, water, and natural and seminatural landscapes that the city consumes, permanently changing its traditional uses and cover (Morello et al. 1998). It is the imprint of the appropriations and permanent changes of ownership of contiguous territory that the city requires to grow, obtain mineral resources, and dispose of waste materials. The landscape footprint is distinguished from the ecological footprint by contiguousness and border phenomena. The ecological footprint refers to the total area of productive land and bodies of water required on a permanent basis to produce all consumed resources and to absorb all waste materials produced by the agglomeration. Thus, a city has two types of hinterland. The ecological hinterland, which is fragmented and whose fragments are not necessarily contiguous to or near the city, is the area required to sustain present levels of consumption. The landscape hinterland is the near or contiguous territory that is being consumed by the growth of the agglomeration, the development of residential settlements, and mining production (parent rock limestone, expansive clay, and earth) and that, as a result, ceases to be agriculturally productive or to serve as soil-water support for natural and seminatural ecosystems with the relevant change of ownership and/or use.

*Periurban* can be defined as the area of urban and rural interaction where the landscape footprint is made. It is a space contiguous to the city that is affected favorably or unfavorably by that contiguousness (Gutman, Gutman, and Dascal 1987). The periurban system is neither rural nor urban. It is an interface (see Figure 2), where there is increasingly less provision for the various services provided within the urban agglomeration such as drinking water, electricity, storm sewers, pavement, and rubbish collection (Rodríguez 1997). When compared to the rural system, there is also increasingly less provision of ecological services such as the capacity to absorb carbon dioxide; to harness solar energy as chemical energy and convert it into food; to break down organic matter; to recycle nutrients; to control the animal and plant population balance; to prevent pest outbreaks; to regulate water flows; to absorb, store, and distribute short-term river flooding; and to form soils.

FIGURE 2  
THE CHANGE IN ATTRIBUTES ALONG THE URBAN-RURAL GRADIENT



Buenos Aires periurban area's landscape footprints include the following:

- land parceling in city-block-sized lots;
- geophagy (Morello, Matteucci, and Buzai 2001), that is, the extraction of the soil (A, B, and C horizon) for building embankments, for brickworks, and for urban development landfills on land prone to flooding in order to raise the elevation;
- extraction of sections of turf for urban gardens;
- consumption of soil for nurseries and similar operations (another form of geophagy);
- legal and illegal disposal of refuse and industrial waste;
- urban wastelands;
- spontaneous settlements (including squatter settlements);
- country clubs, *barríos cerrados* (closed settlements), and *clubes campestres* (rustic clubs);
- industries;
- heavy infrastructure equipment;
- storage or dumping grounds;

- water purification facilities;
- automobile salvage yards and junkyards;
- clandestine pig farms and farm abattoirs and greenhouse and aviary complexes;
- road construction yards;
- graveyards for higher-income people;
- neoecosystems (brand new ecosystems), that is, seminatural landscapes where the dominant or most frequently occurring species are not native but accompanying and subordinated species; and
- brand new soils derived from landfills of domestic waste material or construction debris and decapitated soils for brick manufacturing.

After the classic description by Charles Darwin, the Argentine Pampas is considered a classic example of a highly vulnerable biogeographic unit in terms of the establishment of exotic species and the formation of ecosystems that are partially or totally stable. In the periurban area of the Buenos Aires metropolitan area, human activities such as selective tree felling, interference with the hydroperiodic pulse through infrastructure construction (dikes, highways), and water and soil contamination have stimulated the successful establishment of neoecosystems. Overexploited forests, deprived of flood pulses, have been replaced with *Ligustrum lucidum* and *L. sinensis* woods, both exotic species introduced as ornamental plants for streets and gardens. Land flooded episodically by water contaminated with heavy metals and hydrocarbons now harbors ecosystems in which the dominant cover species are *Rubus ulmifolius* and *Ricinus communis*, and the dominant species in damp soil borders of flat areas is now *Iris pseudacorus*, another species introduced into gardens for ornamental purposes (Matteucci et al. 1999). These three neoecosystems now occupy larger territories than the ones that they replaced or are in the process of replacing, as is the case with the iris.

#### *Land parceling as indicator of urban growth*

Land parceling is one of the indicators that can be used to assess the conversion of rural landscapes into urban ones and is one of the easiest to quantify, as it can be viewed on old cadastral maps, aerial photographs, and satellite images. Available census and cartographic information were used to study the advancement of parceling. The study area includes the federal capital and the twenty-three administrative sections surrounding it, with an area of 3,880 square kilometers, 60 percent of which corresponded to agglomeration in 1991. The information came from a variety of sources, including the eight national population and housing censuses conducted in Argentina between 1869 and 1991, historical cartography for the first four censuses, official agency cartography for the period 1970 through 1980, and satellite images for 1991 (Buzai 1993).

Eight thematic maps were produced using the Geographic Information System (OSU Map for the PC, version 4.0). These maps show the size and location of the parceled areas at each point in time (1869, 1895, 1914, 1947, 1960, 1970, 1980, and 1991). The maps are like snapshots, and pairs of them can be compared to identify the advancement of the agglomeration.

The soil map of the area was prepared by the Soil Institute of National Institute of Agricultural Technology–Castelar (Instituto de Suelos, National Institute of Agricultural Technology–Castelar), with extrapolation of information from systematic soil surveys by National Institute of Agricultural Technology in the areas surrounding the Buenos Aires conurbation and in the patches of native vegetation and unoccupied spaces that perforate the urban matrix. The ninth thematic layer is soil units, with seven soil association categories (Godagnone and Casas 1996; Palacio 1996). A relief map with four altitude categories was also used.

The Geographic Information System was used to overlay thematic layers to obtain agglomeration maps for each cartographic soil and relief unit and to calculate the areas occupied by each category on each map (Buzai 1993).

*Urban growth of Buenos Aires  
metropolitan region from 1869 to 1991*

In 1869, the Pampa Ondulada appeared to be perforated<sup>3</sup> with eleven plots of parceled land (Morello et al. 2000). The largest agglomeration was in the center of the city of Buenos Aires, which had developed as a port settlement on the estuary of the Rio de la Plata. Corridors of perforations could already be observed along the path of railroads to the west and to the south. Between 1869 and 1895, most growth occurred in the central agglomeration, although it did not combine with the neighboring perforations. During this period, three new perforations began later on, joined by a new railroad, which was built along the coast at the beginning of the twentieth century. Nine lines of dissection<sup>4</sup> were already visible in 1960, the last two of which (highway routes) appeared between 1947 and 1960. New perforations continued to appear until 1991 all along transportation corridors, although the number of agglomerations started to decrease substantially beginning in 1960, when the existing ones began to grow and combine. The Buenos Aires city center grew steadily, and the agglomerations on its border combined to produce a dissection of the grasslands, savannas, pampas, and riverside copses in primitive river valleys, along diverging radii from the city center. Fragmentation, however, is not perceived at the scale of the study. The divergent radii, rather, continued to widen and combine, and by 1970, they all appeared to be forming continuous corridors. The process in general can be described as a creeping fungal growth of agglomeration into grasslands, savannas, and elongated patches of copses. Between 1970 and 1991, no appreciable expansion occurred; the radii widened and combined, and a few new perforations appeared.

Surprisingly, during the last period, the growth in land parceling decelerated, with an initial phase of slow growth between 1869 and 1947 (approximately 7 square km per year), a phase of rapid linear growth from 1947 until 1970 (61 square km per year), and a decrease in the growth rate during the period 1970 through 1991 (16 square km per year). The widening of the radii indicates that the agglomeration was advancing into virtually isolated land between areas that had already been parceled.

Given the low energy and scope of relief, there is no evident association between hypsometry and the growth in parceling; in other words, no clear preference for any particular relief has affected expansion in a particular cartographic unit of relief at the scale of study. At the first three points in time, agglomeration had moved into land situated 10 to 20 meters above sea level, probably as the result of this cartographic unit's proximity to the coast. Substantial amounts of land below 10 meters (such as the present sites of the Palermo Hippodrome, the airport, and the promenade) were later reclaimed from the river and were therefore not available during the initial stages of growth in the city center. From 1960 onward, most of the growth occurred at the 20- to 30-meter level. Land above 30 meters occupies a small fraction of the area studied and is situated far from the coast, with the exception of one peninsula over 30 meters altitude, which leads to the bank of the estuary. Accordingly, this area might be expected to include the smallest proportion of parceled land at all points in time. Of course, the risk of flooding has consistently been the key determinant in space occupied by the elite and low-income populations. The social map of the city prepared by Torres (1992), using indicators such as the number of persons employed or holding university degrees by census area, shows a clear socioenvironmental segregation with relation to flooding. In 1960, the Matanza river valley appeared to be totally parceled along the middle and coastal sections, and the Reconquista River Valley<sup>5</sup> seemed to be fragmented by parceling in sections along its path. In 1991, most of the land between 0 and 20 meters was already occupied. One might expect all subsequent growth to move into land in the 20- to 30-meter range, corresponding to higher areas' being more valuable for agricultural production.

Despite the importance of agricultural production to the national economy and the soil's suitability for this activity, since the beginning of Argentina's urban history, the rolling relief cut by ravines, streams, and tributaries of the Parana-Plata System and a predominance of soils suitable for agricultural activities typical of the Pampa Ondulada (land use capacity [LUC] II) have made the Pampa Ondulada a preferred expansion area for the agglomeration. In 1869, 37 percent of the 3,321 parceled hectares were situated on this land type, and 10 percent in another section of the Pampa Ondulada endowed with deep, rich soil (also LUC II). Forty-nine percent of the parceled land was on the terraces of the River Plate (LUC IV), and only 4 percent were in the depressed coastal fringe (LUC VII) and other units less suited to agricultural production (LUC III). The soil type was clearly not a factor in planning growth in agglomeration. The larger land units, which are of most interest as they have the greatest LUC, register low occupation levels, implying that all future growth in agglomeration will occur on agricultural land.

*Sustainability changes during the past decade  
(1992-2002) in the Rolling Pampas cities*

A similar study performed in the city of Rosario, located on the Río Paraná coast, to analyze urban growth from 1931 to 2000 (Buzai and Baxendale 2002) shows ten-

dencies comparable to those of Buenos Aires. Rosario agglomeration grew from 52.2 to 199 square kilometers in sixty-one years. Between 70 and 75 percent of the best agricultural soils (LUC III) of the study are covered by the agglomeration at all times. This is probably the tendency in the thirty-one agglomerations with more than 100,000 inhabitants of Argentina, most of which are coastal cities.

During the past decade (1991-2001), Argentina's social conditions worsened significantly. The unemployment rate increased steadily from 5.3 percent in October 1991 to 18 percent in October 2001 for the whole country. The figures for the urban agglomerations are 7 percent in 1991 and 14.7 percent in 2001 (Instituto Nacional de Estadística y Censos de la República Argentina 2003a, 2003b). In 1991, 19.7 percent of Buenos Aires citizens lacked access to primary health care facilities; in 2001, the figure increased to 26.2 percent (Instituto Nacional de Estadística y Censos de la República Argentina 2003a, 2003b). Within urban populations in cities with more than 100,000 inhabitants, the percentage of people living below the poverty line increased from 21 percent in 1991 to 57.5 percent in 2002, of which 27.5 percent are below the line of absolute poverty. Even though there are no figures to assess the urban population in informal settlements, we hypothesize that these populations have expanded and increased due to the migration of impoverished farmers, cotton pickers, and so forth to big cities, first to the municipal capital, later to the province's capital, and if possible, to the few cities of more than 0.5 million inhabitants in the Rolling Pampas. Residential urban settlement for the high-income population has also increased in number and extension as a response to insecurity in downtown areas.

The ecological consequences of the expansion of both formal and informal urban settlements on stream banks and riverbanks are changes in the natural drainage system and decreases in the water infiltration rate of soils due to construction. This increase in vulnerability to flooding is aggravated by water diversion devices upstream; excess water that would be absorbed by the hinterland is redirected to the river, reducing the hinterland's buffer capacity and causing floods downstream, in the city's outskirts, and even in the downtown area.

The floods affect both the settlers and the agricultural lands; for example, the extraordinary flood event of 1940 affected eight cities in the Rolling Pampas, covering 465,000 hectares (Etulain and López 2000). In 1940, 1958, 1989, and 1993, significant human and economic losses occurred in the southeast coastal fringe of the metropolitan area (Nussbaum, cited by Etulain and López 2000). In the flood event that lasted from November 1982 to July 1983 on the Chaco-Pampean Plain, 2,350,000 hectares were inundated and 70,000 persons had to be removed; direct and indirect losses amounted to \$1,650 million and \$3,753 million, respectively (Fundación para la Educación, la Ciencia y la Cultura 1988; Bertoni and Corcuera 2000). In the last events, extensive economical losses resulted from damages to crops, which lower living standards even more. As there are more people inhabiting lowlands, economic and human losses due to natural disasters also increase. Thus, Argentineans seem to be riding a vicious circle of poverty, causing ecological deterioration, causing further poverty.



*The role of policy on urban growth*

The urban-rural conflict in the Buenos Aires metropolitan area must be understood as a parasitic association by which the city encroaches on the rural surroundings, through both parceling and construction on former agricultural land and through resource extraction for use in the newly built areas. Thus, it is not a case of a rich city and poor surroundings but one in which the surroundings are important for the nation's economy.

The conflict goes back a long way, probably since the post-World War II years, when the United States, emerging from the war a powerful nation, set off the European Recovery Plan, which resulted in the exclusion of Argentina from both the international food market and the international transportation network. The

---

*During the past decade (1991-2001),  
Argentina's social conditions  
worsened significantly.*

---

response was a substitute industry that stimulated urbanization and the growth of a periurban population. The conflict peaked during the 1990s, however—a culmination of more than twenty-six years of the neoliberal economic model, which dates back to 1976 with the beginning of the military dictatorship. The military's economic policy reversed decades of protectionist policies aimed at industrialization and developing the internal market. The main contributions of the military government to neoliberalism were the partial opening of goods markets to trade, which caused many local enterprises to go bankrupt, and the opening of capital markets, which gave rise to the prominence of international financial speculation in Argentina. The standard bearers of neoliberalism, however, were Ex-President Menem and his Ministry of Economy who, under the banner of demonopolization of public services by the state to gain in efficiency and social benefits, conducted the privatization of the country's major industries, opened the capital markets to unrestricted foreign capital inflows, and established a currency board system that pegged the Argentine peso to the U.S. dollar on a one-to-one exchange rate.

There is no simplistic explanation for the results of this experience. A combination of factors, such as global economy, transnational cultural and social trends, corruption on the part of local elite, and a long succession of misguided economic and political measures took the foreign debt from \$7.5 billion in 1976 to \$243 billion in 2001 and caused the loss of the country's industrial capacity, the closing of

hundreds of domestic businesses, and extreme inequality in income distribution leading to the disappearance of much of Argentina's middle class (in 1983, the gap between the top 10 percent and lowest 10 percent was fourteen to one; in 2000, the gap grew to twenty-five to one).

The economic stagnation brought about by the successive crises caused the proliferation of squatter settlements in the periurban area in the 1970s; the squatters were low-income groups that could not gain access to land due to the decline of the real salary. Living standards worsened: there was little access to adequate water, sanitation, or refuse collection. In these conditions, both environmental quality and human health were at risk.

The second cycle of land occupation in the periurban area during the 1990s had very different characteristics. Degradation of living conditions in the city pushed the upper middle class to the suburbs. At the beginning, people moved on a permanent basis to their weekend estates; later, increasing numbers of settlements appeared. Since the period from 1985 through 1990, highways have been the preferred axes for the advancing urban frontiers, and with the necessary expressways, they have defined new forms of occupation, with various types of *barrios cerrados* (closed settlements), which by April 1990, covered more than 20,000 hectares and housed 250,000 persons at a very high living standard (Tella and Aguilar 1999). More remote, closed, urban developments have produced perforations in the matrix of agricultural and natural ecosystems, many of which reconcile accessibility with sparse or concentrated occupation of the surrounding area and have eliminated patches of native vegetation, including ecosystems vital to the country's natural heritage, such as jungles on the banks of the Plata River estuary. With liberation of restrictions brought about by neoliberalism, the new suburban developments are accompanied by consumerism: megacenters such as shopping malls, movie theater centers, and various leisure and sports centers; high-technology hospitals; and private university campuses (Tella 2000). These megacenters are not within public spaces and can be reached only by car. Two percent of the population of greater Buenos Aires lives in the various types of suburban closed settlements whose total area equals half the area of the federal capital. Furthermore, this involves individual development efforts that are not coordinated, and there are no direct plans to connect these settlements to the sewer and drinking water systems. Unfortunately, there is no direct relationship between the advancement of parceling and direct need. This is attributable primarily to real estate speculation, as a lead time of as much as five years is required for an area to be ready for acquisition for a business venture (Campanario 1998).

## Concluding Remarks

This study has shown the process of the spread of urbanization to agricultural land in a pilot area, with an analysis based on one of many possible indicators, namely, agglomeration. Other landscape footprints could be better indicators,

since signs of deterioration appear well in advance of parceling in the periurban fringe.

In the 1990s, the urban frontier ceased to advance as a stretching out of the existing urban area, but it is now moving forward in perforations well within the countryside. Each new settlement causes landform modification and the loss of ecosystem services, multiplying the adverse impact and synergistic loss of sustainability.

At present, two different realities coexist within the same space: the squatter settlements and the closed settlements of country houses. Both are equally unplanned and unsustainable.

A national sustainable development strategy is badly needed. It should be accompanied by a reinforcement of public awareness of the role of prime farmland and unique ecosystem patches in both city and rural ecological and economical sustainability. This requirement cannot be fulfilled under the present economic model, with middle-class incomes continually declining and the poorest concerned only about surviving.

## Notes

1. The metropolitan area, also called Great Buenos Aires, is Argentina's largest agglomeration: the third in population and first in area of Latin America.

2. The Rolling Pampas, with 44,000 square kilometers, is a subregion of the Pampean ecoregion, which covers 2,179,303 square kilometers. Argentina ranks eighth in the world in cultivated area and third in cultivated area per capita. The Pampas and a portion of the Chaco region have 100,000 square kilometers under double cropping per year without irrigation, based on five main crops—soybeans, wheat, corn, sunflowers, and sorghum—and its main degradation problem since the 1950s is soil erosion. Soil erosion by running water, loss of fertility, and soil compaction at a 25-centimeter deep layer reduce corn production by 40 to 50 percent, soybean production by 30 to 40 percent, and the land's price by 20 percent. The critical environmental problems of the Pampean ecoregion are regional flooding with an increasing trend; high erosion rates in the subregion with a larger urban population (Rolling Pampas), also with an increasing trend; and the fragmentation and disappearance of the few remaining patches of natural ecosystems.

3. Perforation is the process of making holes in an object, such as a habitat or land type (Forman 1995). Of the identified spatial processes, it is probably the most common way of beginning land transformation.

4. Dissection is the process of subdividing a homogeneous habitat or land type with equal-width lines (Forman 1995), such as happens with roads, railways, ducts, and so forth. It is an alternative way to begin land transformation.

5. The Matanza and Reconquista Rivers are two of the three main tributaries in the metropolitan area.

## References

- Bertonati, C., and J. Corcuera. 2000. *Situación ambiental Argentina 2000*. Buenos Aires, Argentina: Fundación Vida Silvestre.
- Buzai, G. D. 1993. Buenos Aires 1869-1991: Análisis SIG de su evolución espacial. In *Annals, Fourth Latin American Conference on Geographic Information Systems, and Second Brazilian Symposium on Geoprocessing*, 333-51. São Paulo, Brazil: Escola Politécnica, Universidad de Sao Pablo.
- Buzai, G. D., and C. Baxendale. 2002. *El crecimiento de la aglomeración de Rosario (1931-2000) y su relación con las unidades cartográficas de suelo, capacidad de uso e índices de productividad. Informe técnico*. Buenos Aires, Argentina: Centro de Estudios Avanzados, Universidad de Buenos Aires.

- Campanario, S. 1998. El Nuevo Mapa del Boom Inmobiliario. *Clarín*, Suplemento Económico, 9 August.
- Commission on Sustainable Development of the United Nations Organization. 1995. Sustainable development indicators: Guidelines and methodology. Available from <http://www.un.org/esa/sustdev/natlinfo/indicators/isdms2001/isd-ms2001isd.htm#environment>.
- Etulain, J. C., and I. López. 2000. *Crecimiento y forma urbana. Directrices para una gestión territorial integrada de la franja ribereña de la Región Metropolitana de Buenos Aires. Segundas Jornadas Platenses de Geografía: Resignificando una Geografía para todos*. La Plata, Argentina: Departamento de Geografía, Universidad Nacional de la Plata.
- Forman, R. T. T. 1995. *Land mosaics: The ecology of landscapes and regions*. Cambridge, UK: Cambridge University Press.
- Fundación para la Educación, la Ciencia y la Cultura. 1988. *El deterioro del ambiente en la Argentina*. Buenos Aires, Argentina: Centro para la Promoción de la Conservación del suelo y del Agua.
- Godagnone, R. E., and R. R. Casas. 1996. Los suelos del conurbano bonaerense. Research report. Castelar, Argentina: Soil Institute, Centre for Natural Resource Research, National Institute of Agricultural Technology.
- Gutman, P., G. Gutman, and A. Dascal. 1987. *El campo en la ciudad: La producción agrícola en el Gran Buenos Aires*. Buenos Aires, Argentina: Centre for Urban and Regional Studies.
- Instituto Nacional de Estadística y Censos de la República Argentina. 2003a. Censo Nacional de Población y Vivienda 1991. Available from <http://www.indec.mecon.ar/>. 2003.
- . 2003b. Censo Nacional de Población y Vivienda 2001; resultados provisionales. Available from <http://www.indec.mecon.ar/>. 2003.
- Matteucci, S. D., J. Morello, A. Rodríguez, G. Buzai, and C. Baxendale. 1999. El crecimiento de las Metrópolis y los cambios de biodiversidad. In *Biodiversidad y uso de la tierra: Conceptos y ejemplos de Latinoamérica*, edited by S. D. Matteucci, O. T. Solbrig, J. Morello, and G. Halfiter, 549-80. Buenos Aires, Argentina: UNESCO-EUDEBA.
- Morello, J., G. D. Buzai, C. Baxendale, A. Rodríguez, S. D. Matteucci, R. E. Godagnone, and R. R. Casa. 2000. Urbanization and the consumption of fertile land and other ecological changes: The case of Buenos Aires. *Environment and Urbanization* 12 (2): 119-49.
- Morello, J., and S. D. Matteucci. 1997. El modelo agrícola del Nucleo Maicero como sistema complejo. In *Argentina granero del mundo: Hasta cuando?* edited by J. Morello and O. T. Solbrig, 201-31. Buenos Aires, Argentina: Orientación Gráfica Editora, SRL.
- Morello, J., S. D. Matteucci, and G. Buzai. 2001. Urban sprawl and landscape perturbation in high quality farmland ecosystems: The case of the Buenos Aires Metropolitan region. In *Globalization and the rural environment*, edited by O. T. Solbrig, R. Paarlberg, and F. di Castri, 447-81. Cambridge, MA: Harvard University Press.
- Morello, J., S. D. Matteucci, G. D. Buzai, C. Baxendale, and A. F. Rodríguez. 1998. Aplicación de la tecnología SIG para el análisis del soporte biofísico en áreas metropolitanas como herramienta de planificación: El caso de Buenos Aires. In *Sistemas ambientales complejos: Herramientas de análisis espacial*, edited by S. D. Matteucci and G. D. Buzai, 409-24. Buenos Aires, Argentina: University of Buenos Aires Press.
- Palacio, M. I. 1996. *Cartas a color del conurbano bonaerense: Suelos, capacidad de uso, índice de productividad*. Castelar, Argentina: Soil Institute, Centre for Natural Resource Research, National Institute of Agricultural Technology.
- Rees, W. 1992. Ecological footprints and appropriated carrying capacity: What urban economics leaves out. *Environment and Urbanization* 4 (2): 121-30.
- Rodríguez, A. F. 1997. Cambios de uso de suelos en el entorno periurbano del Gran Buenos Aires: Estudio de usos de neoeosistemas y ecosistemas residuales en el área no urbana del partido de Berazategui. Licenciatura Thesis, School of Philosophy and Literature, University of Buenos Aires.
- Scotta, E. S. 1996. Estimación del valor económico de la erosión hídrica en la agricultura de Entre Ríos. Research paper. Paraná, Brazil: Experimental Agricultural Station, National Institute of Agricultural Technology.

- Secretariat of Agriculture, Livestock, and Fishery, and Federal Agricultural Council. 1995. *El deterioro de las tierras en la República Argentina: Alerta Amarillo*. Buenos Aires, Argentina: Secretariat of Agriculture, Livestock, and Fishery, and Federal Agricultural Council.
- Tella, G. 2000. Efectos de una modernización tardía en la región metropolitana de Buenos Aires: Area N7, Facultad de Arquitectura, Diseño y Urbanismo. Buenos Aires, Argentina: Buenos Aires University.
- Tella, G., and F. Aguilar. 1999. Barrios cerrados. In *Estudio de la ciudad de Buenos Aires en el Sistema Metropolitano*, edited by M. Aguilar and A. Pusiol. Buenos Aires, Argentina: Faculty of Architecture, Design, and Urbanism, UBA-Secretariat of Urban Planning of the City of Buenos Aires.
- Torres, H. A. 1992. Cambios en la estructura socioespacial de Buenos Aires a partir de la década de 1940. In *Después de Germani: Exploraciones de la estructura social en Argentina*, compiled by J. Jorrat and R. Sautu, 158-75. Buenos Aires, Argentina: Paidós.