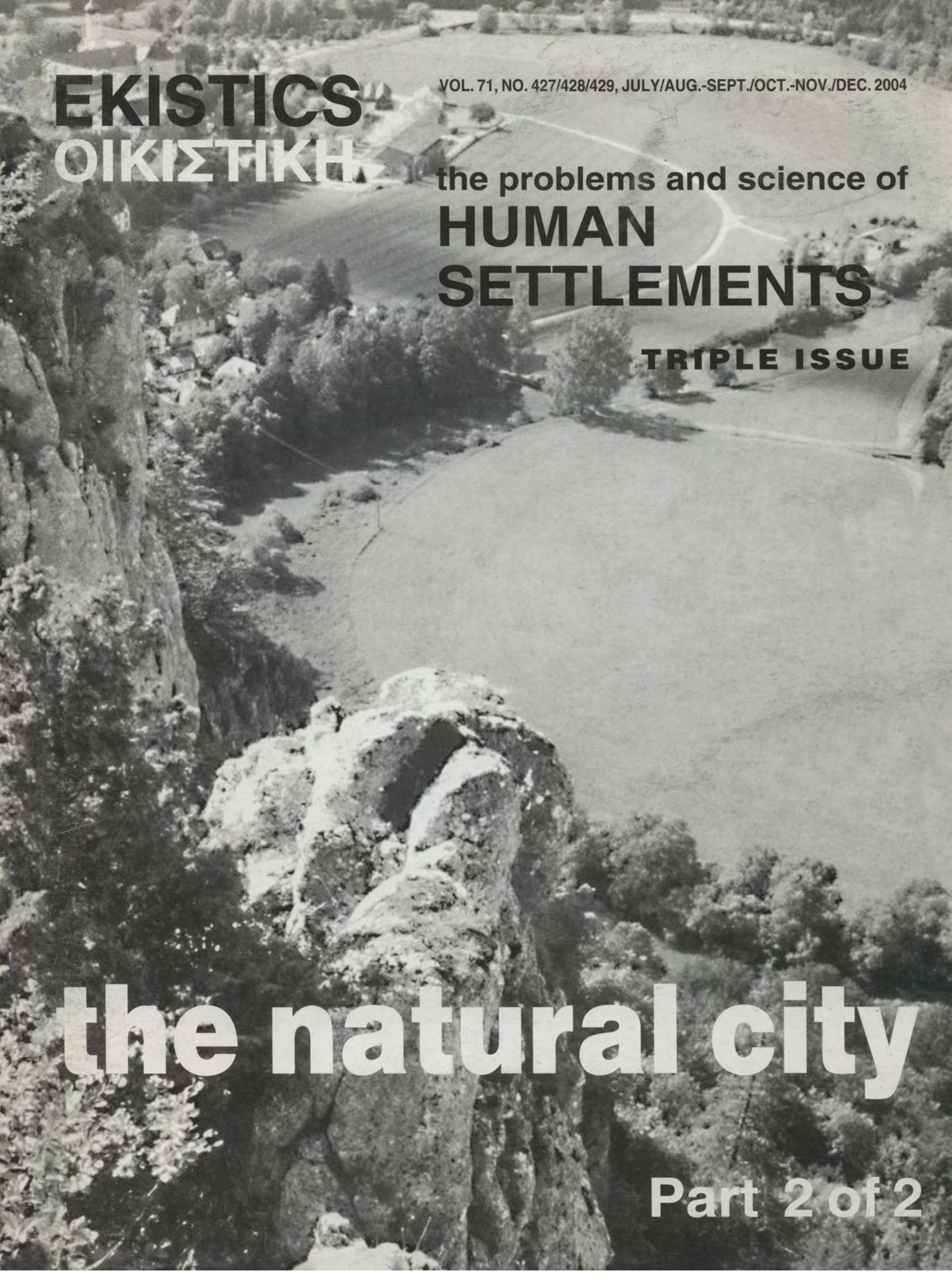
EKISTICS
ΟΙΚΙΣΤΙΚΗ

VOL. 71, NO. 427/428/429, JULY/AUG.-SEPT./OCT.-NOV./DEC. 2004

the problems and science of
HUMAN SETTLEMENTS

TRIPLE ISSUE



the natural city

Part 2 of 2

EKISTICS: the problems and science of HUMAN SETTLEMENTS

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The Athens Technological Organization (ATO)

The Athens Technological Organization (ATO) is a non-profit organization established in 1958 to further technology and scientific research on any subject which can contribute to the improvement of human living conditions, technical and economic development and the training of people capable of pursuing these purposes.

Athens Center of Ekistics (ACE)

Upon its establishment in 1958, ATO started ekistic research and educational programs and later on in 1963 established the Athens Center of Ekistics (ACE) to foster a concerted program of research, education, documentation, and international cooperation related to the art and science concerned with the development of human settlements. In the domain of documentation in addition to its library, ACE publishes the following two journals:

- Ekistics, the Problems and Science of Human Settlements, and
- The Ekistic Index of Periodicals, as well as
- A series of research reports and monographs documenting its following four major research projects:

– "The City of the Future"
– "The Capital of Greece"
– "The Human Community"
– "The Ancient Greek Cities"

Since 1965 ATO-ACE have hosted on their premises the Headquarters and Secretariat of the World Society for Ekistics (WSE), an independent organization, whose goals and objectives are compatible with those of ACE.

●

World Society for Ekistics (WSE)

The Society – an international nongovernmental organization (NGO) in consultative status with the United Nations (ECOSOC) – is a nonpolitical and nonreligious body with limited membership, formed to study man's patterns of living and their physical expression in the past, present, and future. The aims and objectives of the Society are:

- To promote the development of knowledge and ideas concerning human settlements by research and through publications, conferences, etc.;
- To encourage the development and expansion of education in ekistics;
- To educate public opinion concerning ekistics, thus stimulating worldwide interest and cooperation;
- To recognize the benefits and the necessity of an interdisciplinary approach to the needs of human settlements, and to promote and emphasize such an approach.

WSE Executive Council (1 April, 2002 to 31 December, 2004)*

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*The President and all other members of the Executive Council are elected by the General Assembly of members for a two-year term.

For further information on WSE, consult www.Ekistics.org

VOL. 71, NO. 427/428/429, JULY/AUG.-SEPT./OCT.-NOV./DEC. 2004

EKISTICS

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The natural city

- **Part 1: Canadian issues of international relevance**
  (vol. 71, no. 424/425/426, Jan./Feb./Mar.-Apr./May/June 2004)
- **Part 2: International issues of relevance to Canada**
  (vol. 71, no. 427/428/429, July/Aug./Sept.-Oct./Nov./Dec. 2004)

Guest-editor: Ingrid Leman Stefanovic

Part 2: International issues of relevance to Canada

EKISTICS/OIKIΣTIKH: the problems and science of HUMAN SETTLEMENTS

Volume 71, Number 424-429, January-December 2004

The natural city (two parts)

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30 **Toward the green city through revitalizing major obsolescent urban lands** — *Ken Greenberg*
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126 **Lake Ontario Waterfront: Update since "A Decade of Regeneration ..."** — *Marlaine Koehler*
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168 Envisioning the natural city: The guest-editor's foreword *Ingrid Leman Stefanovic*
The contents of this volume "is only the beginning of a conversation that, we hope, will continue as we jointly seek to better understand the full breadth and depth of how to transform our human settlements into spaces that respect the moral laws of nature in all their complexity."

170 Mitigating natural disasters: The role of eco-ethics *David Etkin and Ingrid Leman Stefanovic*
The need for "a process that results in a greater emphasis on our interactions with and reliance upon the natural world, and the development of community resilience."

181 Resettlement of development-induced displacees: Emerging issues *C. Emdad Haque*
A critical review of global experience leads to the need for establishing a participatory decision-making process and, through evaluation of alternative choices concerning major development, largely aims at mitigating to the maximum the usual negative impacts on displacees.

187 The city at the end of the cheap-oil era *Klaus Illum*
The need for "adapting the economy to a decline in oil consumption ... [through] the dismantling of the oil-technological complex so as to ensure that oil demand peaks before oil production capacity peaks."

192 The role of the university in city planning: Cleveland's Lakefront Redevelopment Plan
Wendy Kellogg and Kathryn Wertheim Hexter
Challenges faced and lessons learned from a first two-year program initiated by an urban university aiming at bringing together public and private stakeholders in decision making.

203 Through the (not so) Green Door: University campus greening and curriculum change
James Gray-Donald and David Selby
"The campus does not have to look green to be sustainable or to promote commitment to sustainable lifestyles among staff and graduates." The importance of "working with holistic understandings of sustainability; ... employing a participatory pedagogy; utilizing campus assets to interpret ... [its] environment through sustainability lenses; and giving immediate feedback to the campus community on its sustainability performance."

213 The "Greening the Ivory Towers" Project: The University of Auckland case study
T.W. Fookes, Alison Hall and Logan Whitelaw
Results of Planning students' research based on a "Campus Sustainability Assessment Framework initiated by the Sierra Youth Coalition to "actively promote the inclusion of faculty, staff and students."

223 Non-motorized mobility in cities of the future: College and university campuses as a pilot project *Spenser Havlick*
"The time is at hand to determine whether [university and college] campuses, which are unique microcosms of our larger towns and cities, can demonstrate that neighborhoods, towns and cities of the future can become less dependent on the single occupant vehicle."

228 Tethered vehicle systems for sustainable cities *Richard Gilbert*
Arguing in favor of future land transportation systems to "be dominated by ... vehicles that receive their motive energy via a rail, wire or magnetic effect."

233 "Localization": A means to reduce negative transportation impacts in the "natural city" *Natalie Helferty*
"With the decline in global fossil fuel reserves and the ever-increasing ... climate change, ... air pollution and degradation of nature, localization will not only be desirable, but absolutely necessary."

236 Sustainable housing design and the natural environment *Meltem Yilmaz and Ruşen Keleş*
"... housing design must be based on the participation of users and principles of [sustainable development – reduce, recycle, reuse and recover – combining] new technology and inherited architectural vernacular."

245 Planning the emergent Basque megalopolis as a natural multi-metropolitan complex *Lawrence D. Mann*
The evolution of the meaning attributed to the notion of "natural city" by planners and landscape architects from 1896 to the present, "leading to the idea of an urban natural-artificial trade-off matrix": The case of the Basque urban system.

255 Metropolitan regions: New challenges for an urbanizing China *Edward Leman*
"Focused, policy-oriented, and comparative research on metropolitan regions could help to inform China's policymakers on actions that could lead to... optimal outcomes" of governance and management.

282 Conditions for effective management of a river basin in the European Union *Barbara Zanou*
Methods, data and cooperation among all stakeholders in the process of planning and implementing water management according to the EU Water Framework Directive "in order to promote social, economic and environmental benefits from water uses and services on a sustainable horizon."

289 Global urbanization, is it sustainable? The challenge to the UN World Urban Forum in Vancouver, 2006 *H. Peter Oberlander*
"... the time has come to reverse the inevitable and enlist global societies and their human and economic resources to maintain the city's historic civilizing impact."

295 Ekistic grid index

298 The anthropocosmos model

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Cover: Early human occupation sites along the upper reaches of the Danube River and its tributaries in southern Germany (*Source*: Larson et al., "The Urban Cliff Hypothesis and its relevance to ekistics," p. 79).

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To the Reader

As is stated in the tables of contents (pages 165-166), the papers solicited by Ingrid Leman Stefanovic, guest-editor, for the special volume of Ekistics (vol. 71) entitled "The Natural City," are organized in two parts, in two corresponding triple issues of the journal, as follows:

Part 1: Canadian issues of international relevance
(Vol. 71, no. 424/425/426, January/February-March/April-May/June 2004)

Part 2: International issues of relevance to Canada
(Vol. 71, no. 427/428/429, July/August-September/October-November/December 2004)

The present issue is Part 2.

The reader interested in the contents of the entire volume should also refer to Part 1 of which the detailed table of contents is given on the pages that follow (pp. 293 and 294).

EKISTICS/ΟΙΚΙΣΤΙΚΗ: the problems and science of HUMAN SETTLEMENTS
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The contents of this volume "is only the beginning of a conversation that, we hope, will continue as we jointly seek to better understand the full breadth and depth of how to transform our human settlements into spaces that respect the moral laws of nature in all their complexity."

11 A contract with our future: A keynote address *Robert F. Kennedy, Jr.*
"Environmentalists are injecting the long view, the trustee obligation, into the political process."

15 Cities are successful because they are civic: The 2004 C.A. Doxiadis Lecture: *David Crombie*
The public realm, place and community, the value of a marketplace and economic opportunity, and relationship with nature – The four organizing components of civic culture: The case of Toronto.

20 Evolving cities into a sustaining and sustainable habitat *Willem H. Vanderburg*
"To create a knowledge infrastructure capable of guiding the evolution of the urban habitat toward livable and sustainable cities requires the introduction of a preventive orientation into each and every relevant area of specialization [which], in turn, will lead to beneficial synergistic effects between" them.

26 Urban sustainability and public awareness: The role of the National Round Table on the Environment and the Economy in Canada *Edwin Charles Aquilina*
Working closely "with the full range of partners and stakeholders [in] building public engagement with the sustainable future of which the natural city is one important part."

30 Toward the green city through revitalizing major obsolescent urban lands *Ken Greenberg*
Five projects of urban regeneration centers near water sites made available by the long, slow, and inevitable process of industrial retreat.

35 The growing role of citizen engagement in urban naturalization: The case of Canada *Stewart Chisholm*
Recording activity since 1991, assessing results and suggesting principles for future action by "Evergreen" – a national, non-profit environmental organization "that brings communities and nature together for the benefit of both."

45 Downsview Park, Toronto: A part of the natural city of the 21st century *Tony Genco*
The early stages in the process of implementing "a winning formula for the creation of an urban park ... and a leading edge sustainable community to realize the potential and opportunity of building a natural city."

52 The price of sprawl in Ontario, Canada *Ray Rivers*
Adding "a positive tax to land converted from farm use to urban sprawl [and/or] promoting inner city development by requiring the purchase of sprawl offsets ... might ... assist in re-balancing the market place for development land."

57 Is Smart Growth a smart adaptation strategy? Examining Ontario's proposed growth under climate change *Brad Bass*
"A strategy to increase urban vegetation will confer many benefits that are currently inadequately addressed" and will also reinforce those elements "that reduce ... vulnerability to climate change": A critical assessment of current regional planning initiatives.

63 Financial incentives for behavioral change in the ecological city *Rodney R. White*
Assessing "the implications of climate change for water availability and the potential for the application of urban environmental finance ... to the three main physical throughputs of water, energy and solid waste."

68 The environmental costs of femininity *Carly Bowman*
A review of health and environmental risks deriving from cosmetics and related industry – and a call for women citizens to "to lobby government for a more inclusive regulatory regime."

76 The Urban Cliff Hypothesis and its relevance to ekistics
Doug W. Larson, Uta Matthes, Peter E. Kelly, Jeremy Lundholm and John A. Gerrath
If "our attitudes and feelings about the built environment have ancient evolutionary roots" and the flora and fauna of our landscapes are "largely rock outcrop species ..., then it becomes possible to ... create both efficient and comforting environments."

84 Ecology in the natural city: Testing and applying the Urban Cliff Hypothesis *Jeremy Lundholm*
"The acknowledgment that cities may be functionally 'natural' to non-human organisms may yield tangible benefits as well as provide a strong foundation for revitalizing our conceptions of urban places."

90 Green Buildings Policy: An analysis of three market-oriented innovations *Jesse Zuker*
The assessment of the quantitative and qualitative impacts of each of "three innovative applications that address the barriers to sustainability in the design, construction and real estate sector ... developed in the USA [if coupled with] a review of European, Japanese and Australian initiatives, ... [could] provide an in-depth understanding of the best instruments that could be applied in Ontario."

102 The use of wood for construction and energy in the natural city – The case of Canada
Gundolf Kohlmaier
As part of Canada's commitment to contribute through its cities to climate protection, its "forest ... industry could expand its wooden home exports considerably by designing low energy and high-tech houses, while providing their wastes for heating systems."

113 Housing in the natural city: The role of prefabrication *M.T. Gorgolewski*
The huge potential towards a more sustainable supply of houses through "providing products appropriate to local culture and climate, yet based on industrial efficiency, and the latest technology."

118 The Oak Ridges Moraine: A story of nature in the Greater Toronto Urban Region
David Lewis Stein
"... the conflicts that come with trying to preserve green space in an expanding metropolis."

123 Lake Ontario's Waterfront : Realizing a decade of regeneration *Suzanne Barrett*
Assessment of multiple initiatives by the Toronto Waterfront Regeneration Trust and Identification of essential ingredients for continuous successful regeneration in the decade 2000-2010.

126 Lake Ontario Waterfront: Update since "A Decade of Regeneration ..." *Marlaine Koehler*
Recording the successful efforts of a private local partnership initiative to complete, enhance and promote the implementation of an originally provincial environment program.

133 Organizing political support for the natural city *Preston Manning*
Five concrete policy proposals in an Agenda for Change and three concrete strategic suggestions for effective action towards the realization of the natural city.

135 Building on success in Mississauga, Ontario *Hazel McCallion*
A City "needs the support of the entire community to make ideas and initiatives possible": The long success story of Canada's sixth largest city.

138 Federal-provincial governance and the future status of Canadian cities *Frank Smallwood*
To counteract federal and provincial governments restricting policies, local governments should launch advocacy campaigns to strengthen their decisions and fiscal capacity through the Federation of Canadian Municipalities and forge alliances with urban businesses, the media and environmental groups.

145 Ekistic grid index

Cover: Early human occupation sites along the upper reaches of the Danube River and its tributaries in southern Germany (*Source*: Larson et al., "The Urban Cliff Hypothesis and its relevance to ekistics," p. 79).

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"The Natural City" International Symposion

The University of Toronto's Centre for Environment and the World Society for Ekistics
Toronto, 23-25 June, 2004

Summary of Daily Program

WEDNESDAY, 23 JUNE, 2004

- **Plenary Session**
  - Welcome and Introduction
  - Panel Discussion: The Natural City (dedicated to Jane Jacobs, author and activist in the City of Toronto)
  - The Natural City: Providing the Context

  Part I
  - Session I: The Toronto Setting
  - Session II: Restoring the Brownfields: The case of Toronto's Distillery District: Panel Discussion
  - Session III: The Federal Government and the Natural City

  Part II
  - Session I: Re-Discovering Toronto's Roots
  - Session II: Community Engagement in the Natural City
  - Session III: Contested Images of the Natural City
- **Plenary Session: Keynote Address by Robert F. Kennedy, Jr.**

THURSDAY, 24 JUNE, 2004

Part I
- Session I: The Text of the Natural City
- Session II: Respecting Natural Limits
- Session III: The Architecture of the Natural City

Part II
- Session I: Coping with the Hazards of Nature
- Session II: Building the Natural City
- Session III: The Social and Economic Impacts of Climate Change on the Health of Communities: A Web of Interrelationships: Panel Presentation

Part III
- Session I: The Humanity and Culture of the Natural City
- Session II: Designing the Natural City
- Session III: The Natural Ground of Cities

Part IV
- Session I: Rethinking the Philosophy of Nature
- Session II: Economic opportunities in the Natural City
- Session III: Lessons from India, Japan and Cuba

- **Plenary Session: The 2004 C.A. Doxiadis Lecture by the Hon. David Crombie**

FRIDAY, 25 JUNE, 2004

Part I
- Session I: Promoting Awareness of the Natural City
- Session IIA: Campus Sustainability and Student-Run Initiatives
- Session IIB: Campus Sustainability and Student-Run Initiatives
- Session III: Engineering the Natural City

Part II
- Session I: Greening the City
- Session II: Transportation and the Natural City
- Session III: The Natural Polis

Part III
- Session I: Planning the Natural City
- Session II: International Perspectives
- Session III: Future Challenges for the Natural City

- **Plenary Session: Synthesis – Next Steps**

Opening Plenary Session

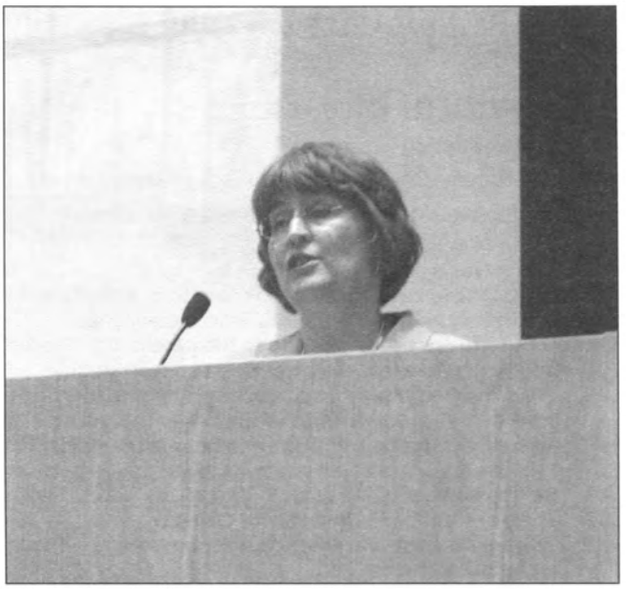

Fig. 1: Dr Ingrid Leman Stefanovic, Chair of the Symposion, delivering her introductory statement on behalf of the University of Toronto and the World Society for Ekistics.

Fig. 2: Left on stage: Participants of the Panel Discussion on the Natural City dedicated to Jane Jacobs, author and activist in the City of Toronto.

Fig. 3: Participants in the Medical Sciences Auditorium, University of Toronto.

The editor's page

● For a long time I have considered any opportunity to collaborate with Dr Ingrid Leman Stefanovic a privilege. This time the opportunity was offered by the international Symposion on "The Natural City" sponsored by the University of Toronto and the World Society for Ekistics which took place on the campus of the university and was organized and chaired by her on behalf of both sponsors.

I wish to thank her for having accepted to act as guest editor for this volume of *Ekistics* in spite of her very heavy commitments due to her role as Professor of Philosophy and Director of the Centre for Environment, University of Toronto.

I also wish to express my admiration for her inspired and inspiring introductory statement on the concept of the natural city (see pp. 168 and 169).

● In this Symposion, an international and interdisciplinary group of approx. 100 experts and a fairly large number of other participants and students held a very intensive three-day program – 4 plenary and 28 special sessions, with several papers and discussions in each (see p. 162) – determined

- to challenge the erroneous but still prevailing perception of "human settlements" and "nature" as independent of each other; and,
- to stress the need for the general adoption of the integration of these two notions – which is inherent in the approach of both convenors of the Symposion.

● The 38 papers contained in this volume, most of which were made available at the Symposion and a few of them at a later date, are organized in two parts, i.e.

- Part 1: Canadian issues of international relevance (vol. 71, no. 424/425/426, January/February-March/April-May/June 2004)
- Part 2: International issues of relevance to Canada (vol. 71, no. 427/428/429, July/August-September/October-November/December 2004).

The papers focus chiefly on the relation of nature and its basic components – from vegetation and all other resources to climate – with the other elements of human settlements, i.e. Anthropos, Society, Shells and Networks. Emphasis is on the desirability for a conscious effort towards maintaining a constant balance between all five elements of human settlements, taking into consideration the dynamic changes identified at present and/or anticipated for the future. On the other hand, the feasibility of such an effort is supported by encouraging cases of success in high-income and technologically advanced communities, particularly at scales from "house group" to "metropolis" – and much less on larger scale human settlements.

For more specific information, in addition to the table of contents, the reader may also refer to the Ekistic Grid (pp. 295-297) for each individual paper and to p. 298 for the entire volume.

● I wish to thank all contributors to this volume of *Ekistics* and Mrs Noriko Doi who provided all the photographic material from the meetings.

● However, I must also express my apologies for the very long time it has taken for these issues to be printed for a variety of reasons – most of them beyond our control.

In addition, I personally wish to ask the guest-editor and the following authors – David Etkin, James Gray-Donald, Natalie Helferty, Hazel McCallion and David Selby – to forgive us for using their papers in this pre-dated volume. These papers were written and made available to us much later than the time of the 2004 Symposion – in fact three of them were presented at the second Symposion on "The Natural City" in 2006 focusing on "Success Stories." Their attractive topics represented essential contributions with new dimensions to the Natural City concept and I could not resist the temptation to make them part of the present volume.

P. Psomopoulos

Envisioning the natural city

The guest-editor's foreword

Ingrid Leman Stefanovic

The author is Guest Editor for the present volume of Ekistics (vol. 71, nos. 424-426 and 427-429, 2004) on The Natural City. Dr Stefanovic agreed to serve as the Director for the new Centre for Environment, University of Toronto, commencing July I, 2005, for a five-year term. She is the former Director of the Division of the Environment, one of the three units now integrated into the new Centre, and former Associate Chair for the Department of Philosophy at the University of Toronto. Dr Stefanovic is a Professor of Philosophy, whose teaching and research focus on values and perceptions of environmental decision making. She has a 30-year teaching and research career in interdisciplinary fields, ranging from environmental ethics to urban planning and environmental policy development. Her most recent book is entitled Safeguarding Our Common Future: Rethinking Sustainable Development *(SUNY, 2000). Dr Stefanovic, one of the earliest members of the World Society for Ekistics, having served on various occasions as member of the Executive Council and officer of the Society, was the organizer and acted as Chair of the international symposion on "The Natural City," 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics.*

The move to embrace nature today is not a rejection of capitalism, consumerism and the city, as was perhaps the case in the 1960s and 1970s. It does not promote finding freedom on 50 acres in the wildemess or country. Instead, it is a movement to embrace nature in our lives in the city.

V. Schaefer, H. Rudd and J. Vala, *Urban Biodiversity*[1]

My 80-year old father and I took a favorite walk together the other day. Crossing a busy Toronto intersection, we meandered into the University of Toronto campus – a world of stone buildings, wandering walkways, groves of stately elms and maples, and flower gardens with colors that dazzle. Moving through the quiet olfactory embrace of rose bushes and marigolds, our conversation moved effortlessly, agelessly. Passerbys included children, students and the elderly, moving in and out of our universe, never intruding upon the special space that the walk preserved between us. Looking upwards, my father remarked at the grey-blue ceiling of light cloud cover – and how much he preferred that to the picturesque cumulous images of picture postcards. A cheeky squirrel made us stop and remember fondly a walk along this same path 40 years ago when, as a child, I had fed an acorn with my father to one of this squirrel's ancestors: memories of years past wound themselves into an otherwise timeless moment.

In very many ways, our walk was through what I would call a "natural city." Certainly, the experience was defined by greenery and wildlife, from birds to dogs, raccoons and squirrels, from flies to the extraordinary spider, weaving its exquisite web along the bench where we sat.

Four million residents inhabit Toronto, a city that is embedded in an ecologically rich landscape that hugs the shores of Lake Ontario, and is nestled within a pattern of ravines and a floodplain of three large rivers. The water that we drink from those rivers and the lake today has passed, for generations, through the soils, through other beings. We are joined, ecologically speaking, to others both in space and through time.

A natural city certainly demands a level of biological diversity to ensure good health, both of the ecosystems and the humans who inhabit them. However, the vision of a natural city invites us to think more broadly still. The walk that my father and I enjoyed was made more meaningful by virtue of the social and cultural milieu as well. Our own conversation was as peaceful, as meandering, as the landscape itself. Others who passed us – people of different racial and cultural traditions – implicitly reminded us that respect of difference, acceptance of difference, happens in this city more than in almost any other in the world.

The science of Ekistics teaches that, additionally, cities support technological, economic and regulatory functions as well. Significantly, my father and I were surrounded by the technological symbol of urban form – cars – but, because of the courtyard design of the spaces through which we moved, the evening rush hour buzz was dimmed by thoughtful campus design.

While North American society is defined by consumerism, our walk was also special because financial considerations could be set aside for the moment – and yet, it must be admitted that the beautifully tended landscape was only made possible by a strong University, city and national economy.

Even the regulatory function can be seen to have impacted upon our walk. Living in a free, democratic Canadian society, my father and I could move within a city of 4 million people, feeling safe, feeling at liberty to speak about anything that came to mind. Others around us could do the same.

In this regard, I am moved to admit that – in addition to the biological, social, cultural, technological, economic and regulatory functions – a natural city must also be understood as a *moral* phenomenon. It is more than merely an ecological inventory of species, no matter the number and diversity. The concept of "nature" has been studied by philosophers at many different levels and, clearly, to explore this concept in depth is beyond the parameters of this Foreword. Nevertheless, I am reminded that the Latin *natura* is derived from the verb "to grow," and "to be born." For the Ancient Greeks, nature emerges and abides as *physis* – which gathers together notions of origin, of the grace of the unspoiled and of goodness.

Fig. 1: Professor Ingrid Leman Stefanovic (middle), Chair of the international symposion on The Natural City in Toronto (23-25 June, 2004) at the inaugural plenary session with her father (right) Alexander B. Leman, President of the World Society for Ekistics, and P. Psomopoulos, Secretary General of the Society (left), presenting her with a marble copy of an ancient Cycladic statuette from Greece on behalf of all participants in recognition of and admiration for her overall effort in organizing the symposion.

When we speak of the natural city, the intent is to point towards such notions as well – of the authentic and the true, and of a grace and source of creation of a world that will always exceed the parameters of narrow human manipulations. Certainly, there is a hermeneutic element to this as well: the interpretation of what constitutes a "natural city" will always be partial, finite, and never universal.

Ecologically speaking, our walk was hardly in a *wilderness* environment and for some biologists, defining a university campus as "natural" is, at best, naïve. Equally, one can say more about the social, cultural, economic, technological, regulatory and moral elements of our walk.

Nevertheless, to describe the experience of a "natural city" is not to aim to present a universal prescription. Life and lived experience are far too complex for neat, compartmentalized manuals. For this reason, we must come at the concept of the natural city from many different angles.

This volume of *Ekistics* presents a broad collection of perspectives on this issue. It is only the beginning of a conversation that, we hope, will continue as we jointly seek to better understand the full breadth and depth of how to transform our human settlements into spaces that respect the moral laws of nature in all their complexity.

As a final point of indulgence, I ask the readers to allow me to dedicate the work that I have personally put into this journal, to my father, Alexander B. Leman, the 17th President[2] of the World Society for Ekistics, in the hope that our walks together will continue for many years to come.

Editor's notes

1. Valentin Schaefer, Hillary Rudd and Jamie Vala, *Urban Diversity: Exploring Natural Habitat and its Value in Cities* (Ontario, Canada, Captus Press Inc., 2004), p. 14.
2. Presidents of the World Society for Ekistics:
   Richard Llewelyn-Davies, 1967-1969
   Margaret Mead, 1969-1971
   Jean Gottmann, 1971-1973
   Eiichi Isomura, 1973-1974
   Robert Matthew, 1974-1975
   R. Buckminster Fuller, 1975-1977
   Felipe Herrera, 1977-1979
   Thomas Lambo, 1979-1981
   Earl Finbar Murphy, 1982-1984
   Charles M. Haar, 1984-1987
   Gerald B. Dix, 1987-1990
   John G. Papaioannou, 1991-1993
   Wu Liangyong, 1993-1995
   Charles M. Correa, 1996-1997
   Wesley W. Posvar, 1998-2000
   Udo E. Simonis, 2000-2001
   Alexander B. Leman, 2002-2004

Mitigating natural disasters: The role of eco-ethics

David Etkin and Ingrid Leman Stefanovic

David Etkin currently serves as Coordinator of the Program on Emergency Management at York University, Toronto, Canada. He worked for Environment Canada from 1977 to 2005, collaborating on teaching and research projects over the last ten years with members of the Institute for Environmental Studies at the University of Toronto. His area of expertise is natural hazards and disasters. He has 55 publications to his credit, 23 of which are in peer-reviewed journals. He has participated in several international projects dealing with disaster studies, and was Principal Investigator on the Canadian Natural Hazards Project. Ingrid Leman Stefanovic is Director, Centre for Environment, at the University of Toronto and a former member of the Executive Council of the World Society for Ekistics. Her area of teaching and research is environmental philosophy, with a special interest in how values and perceptions affect environmental decision making. Her most recent book is entitled Safeguarding Our Common Future: Rethinking Sustainable Development *(SUNY, 2000). Contact Professor Stefanovic at Centre for Environment, University of Toronto, 33 Willcocks Street, Toronto, Ontario. M5S 3E8 or email ingrid.stefanovic@utoronto.ca.* *The text that follows is a slightly edited version of a paper published in* Mitigation and Adaptation Strategies for Global Change, *vol. 10, pp. 467-490 (Springer, 2005).*

Introduction

Disasters are about human misery. They are about unravelling and reconstruction. Understanding them means more than developing conceptual frameworks, drawing diagrams and calculating numbers. It means glancing into the tragedy that strikes people's lives. Few have expressed this more eloquently than Susanna Hoffman (1998) after her home, along with 3,356 others, was destroyed in the Oakland firestorm of 1991.

"I had no salt. By this I mean I had no salt to put upon my food, and also that I had no salt left for tears. My weeping depleted every grain from my being.

I had no thread. By this I mean I had no thread to stitch my daughter's hem, and also I lost the thread of my life....

I had no numbers. I had lost all the addresses and phone numbers of everyone I knew or had ever known... I lost both my connections and the equations that lead to opportunity.

I had no paper, no sheets, no warm, wooly sweater, no lights... but also no lightness. No joy...

... it was a rapid introduction into deconstructionism.

While standing amid the rubble of my home, I also stood amid the rubble of a social and cultural system."

Whether or not one chooses to explicitly address human impacts in one's work, it is important to keep in mind that our decisions have important consequences, and that we must not divorce disaster prevention from ethics, culture, or the broader social and environmental systems that sustain us. Recent work has discussed natural disasters within the context of sustainable development and holistic thinking (MILETI, 1999). This paper is an attempt to build upon that discussion, by considering where mitigation lies within the broader conceptual geography of our disaster experience.

We address several main themes in the following pages. Following our clarification of some central terms, we identify certain problems arising from current, sectoral approaches to mitigation. Recognizing the limits of these strategies and the need for a broader perspective, we then put forward some tentative suggestions for a holistic eco-ethical understanding of natural disasters that situates the issue of mitigation within a more comprehensive framework.

In presenting mitigation of disaster issues within an eco-ethical framework, this paper emphasizes the interconnectedness between humans and nature, and how a dysfunctional relationship can contribute towards vulnerability. The importance of considering this issue from an interdisciplinary perspective is also critical. Values affect the decisions people make to mitigate risk and, for this reason, differing values can lead to varying degrees of vulnerability. Economist William Reese wrote "*for sustainable development ... the need is more for appropriate philosophy than for appropriate technology*" (noted in STEFANOVIC, 2000). This paper attempts to echo that sentiment.

Clarifying terminology

We would like to begin by clarifying our understanding of some key terms employed in this paper. Of primary importance is our interpretation of the very concept of **mitigation**, which we define as sustained actions to reduce or eliminate the long-term impacts and risks associated with natural and human-induced disasters.

Mitigation actions can be a blend of policies, educational programs, structures (such as dams), design of resistant or resilient systems, retrofitting (such as reinforcing buildings to ground shaking), or land use planning (such as restricting development within flood plains). As such, these actions affect both the social and natural realms. The particular choice of strategies and blend of approaches depends upon a variety of factors, including world view, ethics, taken-for-granted assumptions, resources, capacity to adapt, disaster history and socio-political institutions.

Generally, mitigation occurs through activities that

- reduce risk, or
- transfer/share risk.

Risk reduction can be accomplished by

• modifying the hazard, or
• reducing vulnerability.

Studies of some hazard reduction programs, such as weather modification (including hail suppression), have either had mixed results or not been encouraging. In fact the American Meteorological Society policy statement on planned and inadvertent weather modification, dated October 2, 1998, says "*There is no sound physical hypothesis for the modification of hurricanes, tornadoes, or damaging winds in general*" (WMO, 1995; NOAA, 2003). Other strategies, such as floodways, dykes, land use planning, revegetation of slopes and irrigation can be very effective, and have been widely used.[1]

Within Canada, transferring risk is mainly achieved through:

• insurance (both private and government sponsored, such as crop insurance) and
• government disaster assistance programs.

Internationally, the World Bank and International Monetary Fund (IMF) provide grants and loans to assist developing countries recover from disasters.

Another key term employed in this paper is **ecology** (including its variation within eco-ethical) – a concept that emerged originally from the work of German biologist, Ernst Haeckel, in the 1860s. Haeckel recognized that the etymology of the word leads to the Greek *oikos*, which means house, habitation or dwelling place and *logos*, meaning the articulation or "study of." Ecology, then, is the study of the relationships between organisms and their home environments.[2] While the science of ecology has interpreted these relations in diverse ways, from community to energy models, our reliance upon the term is meant simply to emphasize that individual, living entities (including human beings) cannot exist in isolation from their surrounding habitats.[3] Indeed, there is a case to be made that these linkages are so fundamental as to be a necessary condition of human existence in the first place (STEFANOVIC, 2000). In this vein, we argue that natural disasters occur because of the interdependent relationship between our human species, their dwelling places and the natural world, and that it makes sense to understand this relationship within a broad, eco-ethical framework.

Moreover, when we refer to the "eco-ethical," we are seeking to acknowledge that a genuinely interdisciplinary ecology is also one that invokes questions about tacit value judgments, taken for granted assumptions and worldviews that shape our outlooks on life. The ancient Greeks recognized that *êthos* refers to our fundamental ways of dwelling in the world. Recognizing our rightful place and a fitting attunement between what *is* the case and what *ought* to be the case becomes a central task in critical thinking about disaster mitigation policy.

• **Vulnerability** is used in this paper to refer to the propensity to suffer some degree of loss (e.g. injury, death, and damages) from a hazardous event. This depends upon coping capacity, relative to potential impact. For example, a supertanker is not vulnerable to 2 m waves, though a rowboat certainly is. There are a number of different types of vulnerability that are traditionally addressed:

- physical (such as living in a location exposed to hazards);
- personal (such as age);
- cultural (such as how risks are perceived, and responded to);
- socio-political (such as no or limited accessibility to information, limited control over resource allocation and pertinent decisions);
- structural (such as poorly built, or insufficiently strong or resilient systems);
- economic (such as wealth distribution, economic diversity);
- institutional, both regulatory and jurisdictional (such as enforcement of standards and codes, type of governance); and,
- psychological (dread, avoidance, denial).

It may make sense to add another vulnerability classification – eco-ethical, which occurs when our value system leads to the loss of resilience in the natural ecosystem, which then in turn results in increased hazards or greater human vulnerabilities. In practice, these vulnerabilities are intertwined. Particularly, decisions that determine how and where we build are largely determined by our culture, value systems, economy and institutions.

• Approaches to vulnerability reduction tend to focus on increasing **resistance** (by changing design criteria to protect against more extreme events) or by increasing **resilience** (by creating the capacity to "bounce back" more quickly and easily after a damaging event occurs). The former reduces the number of damaging events, the latter, given that a damaging event occurs, reduces its impact.

The nature and characteristics of resilient ecosystems is discussed at length in Holling and Gunderson (2002). They differentiate between engineering resilience, which tries to maintain an equilibrium near a stable state, and ecosystem resilience, which is measured by the size of a disturbance that can be absorbed before a system changes its structure and flips into a different state. The former emphasized command and control, predictability and efficiency; the latter a set of conditions that allow for adaptive decision making. They argue (and we concur) that it is the second definition of resilience that is needed for a sustainable relationship between people and nature. Organizations that optimize economic efficiency, for example, do so at the price of losing ecosystem resilience.

• Finally, it is our contention that, at the present time, we easily tend to slip into a reductionist, **positivist** framework for environmental decision making. Reductionism assumes that complex problems are best analyzed when they are broken down into smaller, component parts. When such sectoral reduction occurs, a positivist epistemology tends to support the view that reality consists of those entities that can be empirically seen, touched, felt, measured and "positively" quantified (STEFANOVIC, 2000). While such an approach boasts many accomplishments, it fails to adequately account for less obvious, intangible (and therefore, difficult to measure) *relations between* entities within the holistic context that ecology does address. In the following, we consider some of the problems associated with employing a reductionist, positivist framework for considering issues of disaster mitigation.

Problems with positivist, human-centered approaches to mitigation

In a scientific era, the tendency in the Western world has been to try to understand, as well as manage and control, the complexities of nature through sectoral, reductionist analysis. Frequently, such an approach operates within an "anthropocentric" framework, where humans are implicitly viewed as being above nature, and nature itself is viewed as an unlimited inventory of resources for human consumption and control (STEFANOVIC, 2000). Within such a framework, the natural environment is a collection of resources exploited by society for sustenance and growth, principally from an *economic* perspective.

The environment is also present as a source of risk, when natural extremes create temporary conditions that lie beyond the normal coping ranges of society. Hopefully, one builds social/economic/physical environments with natural risks in mind such that vulnerability is minimized (for example, using building codes or other safety standards), but when these natural hazards do trigger an existing social vulnerability, natural disasters occur.

Society's coping range is defined in part through a series of sectoral design decisions related to infrastructure, lifelines of communication or transportation and land use practices. Commonly, systems are designed to be resistant to some level of probability, often defined by a return period. This construct, used to define acceptable risk, has often had the net, cumulative, long-term

effect of increasing the costs of natural disasters (MILETI, 1999). The positivist rests assured that measurements of probability have been quantified and regulated. At the same time, simply because a design provides safety against a 100 year flood (for example) does not mean that a community is safe, as the vagaries of nature frequently will create a flood of greater proportions. Risk is increased when people or communities act as if safety has been assured, when in fact it has not.

We mistakenly believe that our quantificational systems are objective, scientifically proven measures, but nature does not always respect our human assessments of boundaries. For example, where urban development occurs and natural infiltration of rainwater into the ground is greatly reduced, storm sewers are used to limit flooding. However, extremes sometimes occur beyond the design of the sewer system and, frequently, few natural buffers exist to control flooding. When a flood does occur, the costs are unexpected. By such actions, society has not been engaged in "wise use" as Gilbert White would say and ultimately has transferred risk to future generations (MILETI, 1999).

Generally, in risk assessment, we tend to rely upon quantificational methods of analysis but increasingly such approaches are seen to be limited in scope. Often, we concentrate upon identifying "objective" probabilities of failures of technical systems at the expense of incorporating non-quantifiable probabilities of human error, for instance. Conrad Brunk (1995, p. 160) questions these priorities, suggesting that non-quantifiable elements can be crucial. "Just what was the 'objective' probability," he asks, "that the maintenance crew at Three Mile Island would forget to re-open the valves in the auxiliary cooling system after routine maintenance (the major contributory factor in the accident)?" Try as we might to capture all eventualities within our reductionist frameworks, the human factor is one example of an element that exceeds positivist measures in any definitive sense.

It is beginning to be evident that many environmental risks exceed simple, mathematical measures. Is risk to be measured simply in terms of the number of human lives lost, diagnosed illnesses or GDP? New concepts are emerging that cannot be easily quantified and yet are seen as valuable. Examples include notions of integrity, resiliency, sustainability and ecosystem health. Brunk (1995, p. 157) reminds us that "because probabilistic risk assessment is a quantitative methodology, whose output is only as reliable as the quantitative precision of the data input into its algorithms, it is strongly biased in favor of identifying only those values 'at risk' that are easily quantifiable. These are not necessarily the values most important to the general public. Among the values excluded, for example, are those of personal and collective autonomy, matters of fairness in the distribution of risks and benefits, as well as cultural, religious and 'metaphysical' values."

Brian Wynne, Director of the Centre for the Study of Environmental Change in Lancaster, U.K., echoes these sentiments when he points out that "what can actually be measured frequently dictates the structure of the resulting knowledge" (1992, p. 113). Certainly, averaging, standardization and aggregation are necessary components in quantifying risk. Nevertheless, "the fact that this is necessary and justified does not alter the point that it imposes man-made intellectual closure around entities which are more open-ended than the resulting models suggest." (WYNNE, 1992, p. 113).

To quantify and assess risks, then, in a narrow, reductionist manner is to jeopardize significant issues that cannot fit the model but nevertheless are important to the broader public and do substantially affect mitigation efforts. Real social, as well as ecological impacts, may be excluded in such a system that neglects to address non-quantifiable concerns.

In fact, reductionist paradigms very frequently lead to an overemphasis on risk in the first place. Mary O'Brien (2000) questions this emphasis, by providing numerous examples to show how current, narrow approaches to risk assessment – aiming at impartiality – have led, nonetheless, to governments and industry sanctioning the widespread contamination of air and the poisoning of wildlife and groundwater. She offers another decision-making technique that she calls "alternatives assessment" that is broader in scope than traditional risk assessments. Instead of attempting to unsuccessfully quantify risks and thereby generate oversimplified predictions, O'Brien argues from the premise that it is simply unacceptable to harm human or ecological health, if there are reasonable alternatives. Through broader public dialogue, more informed decisions can emerge from a holistic framework that seeks to minimize ecological damage while achieving social goals.

In a similar vein, Wynne (1992, p. 114) argues that other forms of uncertainty than risk are at play in hazardous situations, such as indeterminacy and ignorance, for example, where we may not know what we do not know and causal chains remain open and unsure. Many hazards are basically indeterminate: the dangerous decrease in stratospheric ozone in the earth's atmosphere was not recognized until it had actually occurred. We are asking the impossible from scientific risk assessment, if we expect "objective" analysis of previously unacknowledged possibilities – which is not to say that we ought not to assess risk, but rather that we should simply recognize the limits of the process, and perhaps look to supplement these methods of analysis with other, less conventional approaches.

When we ignore these broader considerations of uncertainty, risk is potentially increased in two ways:

- firstly, vulnerability is increased due to a "command and control" approach that ultimately fails (HOLLING and GUNDERSON, 2002); and,
- secondly, some hazards increase as a result of environmental degradation resulting from a consideration of nature as an unlimited resource that can be used as a tool to fuel economic growth, the use of which lacks consequences.

This latter approach has resulted in, for example, depleted ozone layers, deforestation, desertification and climate change. The underlying issue is the assumption that as a result of environmental degradation, systems will not fail, or are not vulnerable to feedbacks resulting from technological adjustments.

Such a positivist, engineering approach to mitigation is embedded in a belief that nature is predictable and controllable by human beings, the roots of which lie in the 17th and 18th century paradigms of Newton, Descartes and other rationalist thinkers, and can be traced back even to Plato (STEFANOVIC, 2000). In part, this approach assumes that science can understand, predict and perfectly engineer the natural world. It is also based on a belief that it is humankind's natural right to control nature, a perspective that places us "above" the natural world (DEVALL and SESSIONS, 1985).

Such anthropocentric value systems that favor human beings over the natural world have deep historical roots in our Western, metaphysical tradition. Current mitigation strategies often reflect those human-centered normative theories. Consider, for example, the construction of dams and dykes. These engineered structures are intended to alter and control hydrological systems, expressly for human purposes of flood control and power generation at the expense of preserving ecological balance.

Examples of such anthropocentric interventions include the Three Gorges dam in China, which may cost more than any other construction project in history. The dam requires the resettlement of many communities and "would alter the current ecosystem and threaten the habitats of various endangered species of fish, waterfowl and other animals, and ...would necessitate extensive logging in the area and erode much of the coastline" (CHINA ONLINE, 2003). Likewise the W.A.C Bennett dam in British Columbia, Canada, has caused a significant drop in water flow

to the Peace-Athabaska delta, one of the largest freshwater deltas in the world (ENVIRONMENT CANADA, 2003).

At times, such interventions have placed environmentalist groups at odds with the proponents of these systems. Failure of technological systems designed to protect people and their built environment can occur in two ways, one being a natural trigger beyond the design criteria of the system, and the other being failure due to such things as lack of maintenance, quality of construction issues or human error. The 1996 Saguenay flood in Quebec is a spectacular example of such system failure, and of the limitations of complete human control over nature, despite engineering ingenuity. A complex system comprised of 45 watercourses and about 2,000 flood control structures owned by 25 different organizations, the defence mechanisms were unable to deal with the extreme rainfall of July 19-20, 1996, and the Saguenay River broke through an earthen dam and created a cascading wave of destruction downstream along its natural hydrological pathways.

The nature of urban development in Canada also reflects this anthropocentric, technocratic bias. Natural drainage systems are eliminated and replaced with impermeable paving and storm sewers. The result has been an increase in urban floods (DORE, 2003). A more ecological approach includes rooftop gardens, increased respect for natural floodways and paving designs that allow infiltration to reduce the urban flood problem and also help curtail urban air pollution.

Anthropocentric views are reflected in several aspects of the recovery process as well. Take the examples of reconstruction using disaster financial assistance arrangement (DFAA) and private insurance. Both of these programs fund recovery after disasters, and can either increase or reduce vulnerability to future hazards, depending upon how they are implemented.

DFAA is funded using tax dollars and, in many respects, assumes a utilitarian ethic. All Canadians contribute towards this funding mechanism. The assumption is that financial assistance for community recovery ensures the overall greater good for Canada or Canadians. This redistribution of wealth is applied using the precept that greater amounts of aid should go towards those who have lost the most, up to some maximum amount. There may well be some people in far greater need who get no or little assistance (the homeless for example), but this particular application of the greatest good is based upon equal distribution of opportunity in proportion to incurred loss (in the sense that all those who suffered from the disaster should have an opportunity for maximum possible aid), as opposed to the uniform distribution of welfare or resources.

At the same time, the disaster financial assistance program also motivates us to assist those who have suffered through no fault of their own. Canadians feel obliged to help those in need and, in some sense, the assumption is also that citizens have an individual right to expect some aid from governments during their times of need. This right is not unlike the perceived right to health care that, supporters claim, ought to be available for all Canadians, no matter their income level.

While this kind of social aid is crucial to the recovery process, it has been criticized from a number of perspectives that can be traced back to conflicting moral claims. For instance, one criticism arises within a concern of who carries the burden of responsibility for recovery costs. A utilitarian ethic supports the notion that financial assistance should be distributed to advance the maximum possible good for the greatest number. In this case, one concludes that governments ought to provide assistance for disaster recovery to the maximum number of those who have been affected by a disaster.

On the other hand, does this blanket obligation to assist in recovery apply to all equally? Do our individual rights and freedoms as Canadians also include the right to choose to live in risk-prone areas? Some people who bought properties in flood plains zoned for residential use by a municipality may not have had knowledge that they did so. However, it is a different case when victims of a disaster are perceived as knowingly and willingly having accepted undue risk by living in hazardous zones, without taking reasonable risk-reduction actions (such as flood proofing or buying extra insurance). Then, there is a strong argument to be made that the misery is self-inflicted, and the responsibility for recovery remains with the afflicted community and individuals. This is similar to the argument that smokers should pay more for health care. While we may, as utilitarians, wish to maximize the greatest good for the greatest number, do all members of that "greatest number" have equal rights to compensation?

Indeed, DFAA programs can be criticized, precisely because they shift the burden of responsibility to governments who will eventually cover the costs and, therefore, allow citizens to engage in more risk-prone activities. Disaster assistance tends to create a culture of complacency (or even dependence). Such a culture, when it occurs, increases vulnerability and raises the question of whether disaster recovery initiatives should more properly be assumed by individual property owners, and in a more direct manner.

The same dilemmas apply when it comes to insurance. In the U.S., a government sponsored National Flood Insurance Program (NFIP) exists. One of the founders of the program, Gilbert White, has noted that the net effect of the program was to encourage development within flood plains, thereby increasing flood damage and the overall vulnerability of society. "The net effect ... of practicing such a national policy – for which now about 30% of the property owners in floodplains these days buy insurance – may be counter-productive, and the result is an increase in annual losses from floods rather than a decrease. Rather than promoting wise use of floodplains, it might enforce ... unwise use" (WHITE, 1999).

This view has also been supported in a recent paper by Larson and Plasencia (2001) who state that "annual flood losses in the United States continue to worsen in spite of 75 years of federal flood control and 30 years of the National Flood Insurance Program." In the U.K., a similar situation seems to exist. David Crichton (personal communication, March, 2002) noted that the "1961 UK insurance guarantee ... has had the effect that in many ways flood insurance has been taken for granted by government, planners, and developers, and many housing developments have taken place since 1961 in high flood hazard areas."

This kind of risk-prone behavior occurs because individuals and communities view the consequences of their actions upon the environment as lying elsewhere. Instead of seeing their conduct in terms of broader, eco-ethical impact, they choose to either ignore the risk or shift responsibilities for their actions or inactions to other agencies. At least one Canadian study supports this view, that being the Michigan vs. Ontario flood damage comparison (BROWN et al., 1997). In this study, it was found that a set of storms affecting both areas resulted in costs of about US$500 million in Michigan, but less than $0.5 million CAD in Ontario, as a result of greater development in Michigan flood plains. This difference results from different cultures, the former that allowed flood plain development (with some restrictions with respect to the purchase of flood insurance), and the latter that restricted it. Within Ontario, development within flood plains was actively discouraged and prohibited, with planning and flood control done on a watershed basis through conservation authorities. The U.S. relied largely upon the National Flood Insurance Program (NFIP), which was based upon the theory that "if property owners are required to purchase flood insurance at actuarial rates that reflect flood risk, and if risk is reduced through regulations that require the elevation of new construction in flood plains and avoidance of development in floodways, the added costs of construction in the floodplain should dissuade uneconomic uses" (BURBY, 2001).

In practice, the NFIP suffered from a number of deficiencies,

including incomplete flood hazard identification, flawed methods and poor marked penetration. Burby (2001) noted that the NFIP may even have stimulated building within the 100 year floodplain. Also, even if buildings within flood plains were protected against the 100-year flood, they would certainly be vulnerable to events of greater severity, which could account for increased flood losses relative to a strategy prohibiting floodplain development. Though our entrenched beliefs in property rights may also lead some to conclude that we have the right to build in risky areas, the reality is that some portion of the costs for such actions are inevitably bome by society at large and thereby increase overall social and ecological vulnerability.

Nevertheless, many do believe that individuals at risk have the responsibility to purchase insurance to protect their property so that recovery can occur, should disaster strike. Those who do not buy insurance have gained the benefit of not paying premiums, and have made a choice to assume the risk that goes with that benefit. It follows that they should accept the cost of their decision, in the event of calamity.

The issue becomes complicated, however, when one realizes that the ability to buy insurance varies with the socio-economic stratum of the individual or community and, therefore, recovery relying upon this process tends to maintain or accentuate socio-economic ramps. Reliance upon this method alone discriminates against the less wealthy classes of society, who are presumed to contribute towards the greater social good, but who may not be able to purchase insurance, or sufficient insurance. This is one of the reasons that societies with unequal distributions of wealth are considered to be more vulnerable to natural disasters. From a utilitarian perspective, insurance is a useful but insufficient tool for disaster recovery.

In fact, it must be remembered that not all hazards are insurable (for instance, residential flood insurance is not available in Canada). In practice, the purchase of disaster insurance is not always encouraged, since it is often more politically expedient to assist the recovery of victims whether they have purchased insurance policies or not. Ecological damage to wildlife and their surrounding habitats is rarely considered in such moments, and yet no amount of insurance can protect them from hazards.

While insurance and DFAA recovery programs have been designed to reduce the impact of disasters, here in Canada as well as in many other parts of the world, they have been criticized for reconstructing vulnerability. One of the reasons for this is that these programs are typically based upon the principle of returning a community to its pre-disaster state. This policy may have something to do with an enduring sense of place identity on behalf of residents. If that location remains particularly vulnerable to hazards, then recovery has simply made another future disaster inevitable.

Both types of programs require constraints to discourage risk-taking behavior where it is not appropriate, and to encourage risk-reduction activities. Incentives through reduced insurance premiums have been shown to be one good tool (e.g. the Federal Emergency Management Agency [FEMA] Project Impact uses a "carrot" approach that rewards risk reduction activities). Refusing disaster aid to those who have taken excessive risks (the "stick" approach) might also be a useful but harsh tool though, historically, the political response to this has often been to not enforce it. Refusing aid to disaster victims, especially in media-intensive events, is not politically expedient and runs against an accepted utilitarian ethic of promoting the greater good. As well, people are likely to discount risks associated with rare, extreme events, making the stick approach not as effective as an agent of change as the carrot one.[4]

No matter what kind of insurance policy is put in place, as a society we must begin to realize that neither technocratic, positivist solutions nor juggling different forms of compensation are going to the root of the problem. The fact is that when developing in flood plains, for example, we are acting *in opposition to* existing natural states. To be sure, we need not passively submit to nature's constraints but, at the same time, neither must we act in total disregard of pre-existing natural conditions. Whether we feel justified in damming rivers or fine-tuning insurance policies, moving beyond narrow, egoistic, anthropocentric perspectives opens up different possibilities for mitigation activities. That means that even if a municipality is legally empowered to develop in flood plains, and even if an insurance policy is put into place to compensate potential victims, we must continue to ask questions such as: what kind of compensation are we extending to ecosystems and other non-living victims of disastrous planning? And what kind of imbalances are we creating by refusing to find a proper eco-ethical "fit" between our human actions and the needs and constraints of the natural world?

In an effort to reduce risk, it is important to clarify ethical assumptions and to resolve competing claims (STEFANOVIC, 2003). As the examples above indicate, many value judgments underlying current discussions of mitigation are rooted in a predominantly human-centered ethical paradigm that aims to address such issues as human rights, the greatest good for the greatest number of human beings and, ultimately, risk to human well-being.

In the following, we shall consider expanding these parameters to include broader ecological communities within the dialogue of ethical obligations.

The need for a broader, eco-ethical perspective

While reductionist, anthropocentric values are persistent, the development of chaos theory, our experience with the rising costs and impacts of disasters, numerous case studies that show the negative impact of decision making that excluded the environment, and the development of ecological models that place humans within, not outside, the natural environment, have given impetus to a different paradigm. Natural disasters must be considered within the framework of human ecology, where a complex set of interdependencies exist between society and its natural environment.

We might glean some lessons from Aboriginal traditional ecological knowledge (often abbreviated as TK or, more ironically, TEK). According to traditional Native American teachings, the world exists as an intricate balance of parts to a whole, and humans must recognize this balance in order to maintain ecological health (BOOTH et al., 1993, p. 523; CALICOTT, 1994). Environment Canada's *Science and the Environment Bulletin* (2002, p. 1) rightly points out that, "over centuries of living in harmony with their surroundings, Aboriginal peoples in Canada have gained a deep understanding of the complex way in which the components of our environment are interconnected." A number of resource management boards, commissions and legal agreements, such as the Convention on Biological Diversity, explicitly recognize that Aboriginal traditional knowledge emerges from a holistic view of the world, encompassing biophysical, social, cultural and spiritual awareness and arises from a perception of "humans as an intimate part of [the environment] rather than as external observers or controllers" (ENVIRONMENT CANADA, 2002, p. 1). This recognition is passed on orally through songs and stories: the Haudenosaunee Creation Story, for instance, "tells us of the great relationships within this world and our relationships, as human beings, with the rest of Creation" (HAUDENOSAUNEE ENVIRONMENTAL TASK FORCE, 1992, p. 2).

While the term "traditional ecological knowledge" only came into widespread use in the 1980s and was often dismissed as mere anecdote, governments and policy makers are increasingly coming to a recognition of the importance of indigenous knowledge in public policy. "Time-tested and wise," traditional aborig-

inal approaches to the land provide qualitative information about a variety of natural phenomena (BERKES, 1999, p. 9).

Environment Canada researchers and officials have organized several Elder/scientist retreats to share their knowledge and learn from one another (ENVIRONMENT CANADA, 2002, p. 2ff). Projects across the country bring together government scientists and indigenous peoples to profit from one another's knowledge. Examples include a project in the North, where the Vuntut Gwich'in people – hunters and trappers from the Yukon – advised biologists of dropped water levels in more than 2,000 shallow lakes and ponds in the Old Crow Flats. Upon satellite investigation, supplemented with aerial photos, scientists were able to confirm that lakes are either drying up or draining "catastrophically" – likely one more indicator of climate change (ENVIRONMENT CANADA, 2002, p. 3).

The Government of Canada concludes that these sorts of collaborative initiatives between scientific research and traditional aboriginal knowledge only "improves our understanding of the many and complex influences affecting our environment and the steps we must take to ensure sustainability for future generations" (ENVIRONMENT CANADA, 2002, p. 3). One wonders, for instance, whether an aboriginal reverence of the land as sacred, could find much justification of large scale damming of waterways in the first place.

Aboriginal societies are no longer alone, of course, in recognizing the importance of a holistic perspective on environmental issues. A significant, interdisciplinary approach to urban planning and, in some specific cases, to natural hazards assessment emerged some years ago through work in Ekistics – the science of human settlements. Leading back to the same etymological root as ecology, *oikos,* interdisciplinary Ekistic research has shown that a series of elements and functions define every human settlement at all scales, from individual dwelling to an urbanized world (DOXIADIS, 1968). The elements include:

- nature;
- human beings;
- society;
- buildings and physical infrastructure; and,
- communication and information networks.

In addition, social, cultural, economic, regulatory, technological and biological functions are virtually always present in any human settlement. Different underlying worldviews and attitudes affect their specific manifestation and characteristics. Needless to say, these elements and functions interrelate and any disaster mitigation policy must recognize both the scope of each item individually, as well as the complexity generated through the synergistic relations exhibited in our human settlements. We can no longer address simply one item on the list but must aim towards a genuine interdisciplinary approach to disaster mitigation and recovery programs in order to generate more resilient communities.

James Mitchell (1999, p. 40) has recently pointed out our serious failure as a society "to treat natural hazards as complex systems with many components that often require simultaneous attention. We tinker with one or another aspect of these systems when what is required are system-wide strategies." Mitchell concludes that there has been a growing recognition that "broader interpretive frameworks are necessary – frameworks that incorporate both society and nature and a variety of contextual variables" (1999, p. 43).

Ekisticians have made attempts some time ago to generate such comprehensive interpretive frameworks. Ovsei Gelman and Santiago Macias from the Mexican National Autonomous University (1984, p. 509) presented some preliminary work toward a conceptual framework for interdisciplinary disaster research that would offer the methods and terminology "with which to facilitate the integration of various studies and the consolidation of all related efforts...to safeguard and guarantee the continuity of socioeconomic development at the community, regional and national scales."

In a similar vein, Canadian architect and planner, Alexander B. Leman (1980) generated an interdisciplinary matrix that plotted the impacts of disasters upon the Ekistic elements and functions. Not unlike environmental impact assessments, this model served as a tool for identifying patterns and trends, as well as providing a global overview of priorities for disaster mitigation.

Such an interdisciplinary tool might also help to highlight strengths and weaknesses of mitigation policies. Consider, for example, how plotting such a grid may indicate how a narrow focus on technological solutions may have ignored local social and cultural conditions, thereby decreasing a community's overall resiliency. The very success of some government disaster assistance programs is a debated topic, with some aid agencies such as the Red Cross claiming that the World Bank and IMF have historically contributed to the disaster cycle, due to their particular, narrow philosophical/cultural approaches (IFRC, 2001). These approaches, which typically have been short term, ignored local cultures, emphasizing technologically-based solutions. Increasing debt loads have at times reduced local resiliency and led to cultures of dependency. Both the World Bank and IMF organizations have apparently recognized these issues, and are increasingly advocating broader-based solutions that recognize local capacity building (WORLD BANK, 2002; IMF, 2003). By identifying impacts through an interdisciplinary model, there is a chance that a broader net is cast over a wider set of human settlement elements and functions in our policy development.

As noted earlier in this paper, reducing vulnerability can be accomplished by increasing resistance or resilience (i.e. building fail-safe, as compared to safe-fail). Both are important. However, it is more common for resistance to be emphasized. For this reason, the following discussion focuses on the resiliency aspect of vulnerability, where more opportunities seem likely.

"Building resilient communities" is a phrase that one sees more and more often in the disaster mitigation literature. This makes good sense, but a clear idea of what resilience means is needed. Webster's dictionary defines it as "recovering readily." What does it take for this to occur?

There are two sides to the issue,

- the first relating to the extent and nature of damage inflicted upon a community; and,
- the second related to capacity (i.e. having the resources available for rebuilding).

Canada has done a good job, overall, on the second (above). A relatively wealthy country with a well-entrenched insurance culture, strong technical capabilities and a disaster assistance program, it has the capacity to recover from many severe disasters. No doubt it could be improved, but greater opportunities to increase the resilience of our communities seem likely to exist within the first category; thus an emphasis on mitigation as opposed to recovery. This view has been supported by Senator Terrance R. Stratton, Chair of the Subcommittee on Canada's Emergency and Disaster Preparedness. He noted in 1999 that "we react very well, but we do not mitigate or plan properly for these events – we react to these events. I believe we must go through the process to find out how we can mitigate these events and minimize the damage to human lives. Fundamentally, that is what it is all about. We must do some proper planning."

Within this context, there are two main problems leading to a lack of resilience:

- The first is that society is obsessed with short-term economic efficiency (which can only be achieved with a loss of resilience, such as eliminating system redundancy or capacity). Being economically efficient requires minimizing costs and maximizing benefits. System resilience can only be achieved at some cost, ex-

amples being the maintenance of secondary backup systems to essential services, and maintaining stockpiles of goods (as compared to systems reliant upon complicated transportation systems). For example, Britain was hit by a foot and mouth disease catastrophe in 2001. The disease was able to spread so rapidly because the system that transported cattle created fast disease vectors, as compared to a more conservative but perhaps more expensive one.

- The second problem leading to a lack of resilience is that we do not incorporate the risk of rare high-consequence events appropriately into design (ETKIN, 1999). For example, had the transmission towers that failed during the 1998 Quebec and Ontario ice storm been designed with safe fail properties (such as with collapsible arms, so that the entire tower did not fail) then recovery would have been faster and less expensive. Making systems or structures more resistant does not eliminate or reduce the individual cost of disasters; it makes them less frequent. Designing resilient systems can truly lessen the impact of a disaster.

Building resilience into our designs and systems requires the assumption of failure – something we are often loathe to do, but that experience has shown to be a reality of our existence. We have grown up in a culture that believes humankind can control nature and, while we are successful in this human undertaking in general, the episodic occurrence of extremes beyond our coping range demonstrates the falsity of this conviction. The concept of resilience applies not only to engineered structures, but equally to ecosystems, which act as important buffers to natural hazards.

In fact, integrating technological innovations with environmental, social, cultural and economic concerns opens up new possibilities for disaster mitigation. A prime example emerges from research conducted by Brad Bass at the University of Toronto (personal communication, 2002). Studies have shown that green roofs (rooftop gardens) can have a similar storage capacity for rainwater as compared to large underground storage tanks, used as a safety valve to reduce flooding when sewer systems are overwhelmed. The green roofs cost less, can reduce the storm surges more effectively than storage tanks, and offer a series of co-benefits, including energy efficiency for buildings as a result of reduced cooling costs and improved urban air quality, as well as non-quantifiable benefits related to an improved urban landscape. By "greening mitigation," numerous benefits accrue to society.

Generating solutions requires not only answering, but also asking the right questions. Building resilience requires asking a greater variety of questions, including "under what circumstances will this 'widget or whatever' fail?" "are the consequences of failure acceptable?" and "what can be done to minimize the consequences of failure, when it occurs?"

Though the above paragraphs have emphasized infrastructure issues, the concept of resilience applies equally to the socio-economic fabric. More than one disaster case study has shown how safe building or recovery has been delayed or paralyzed as a result of lack of enforcement of existing codes, lack of incorporation of natural hazards into planning activities, bureaucratic inefficiency, incompetence, corruption or other human factors (IFRC, 2001). Creating resilient communities requires a culture of disaster awareness, good policy and political will. Without these elements, success is unlikely.

Cultural change is difficult to achieve. At a minimum, it requires social learning and adaptive capacity. Through social learning (which emphasizes the importance of observing and modelling the behaviors, attitudes, and emotional reactions of others), people can learn from the experience of others who have reacted to disasters in constructive ways. Increasingly, it is thought that social cohesion is critical for societies to prosper economically and for development to be sustainable. A lack of institutions and networks can be a strong barrier to cultural change, even with the occurrence of social learning. Finally, there must be a capacity for adaptation, both in terms of infrastructure and within the socio-economic framework. Capacity depends upon many factors, including human, physical and economic resources and institutions capable of change. White et al. (2001) explored various reasons as to why disaster losses have been increasing, and conclude that, to a large extent, knowledge of how to reduce losses exists, but was not used effectively. This suggests that the solution to the disaster problem lies more in the social than in the physical or engineering sciences. In order to create a less vulnerable society, is seems that we must learn to do things differently.

Moreover, increased resilience means expanding the boundaries of what we value. Simply directing our attention to narrow, anthropocentric concerns means missing out on wider questions of *appropriate fit* between our own policies and environmental constraints. For too long, we have envisioned ourselves as *above* the environment, rather than as members of the biotic community (LEOPOLD, 1949). As a result, we have operated under the belief that nature could be molded to our own desires and dominated through technical quick-fixes. Some philosophers argue that healthier human settlements can only emerge through respectful attitudes towards the environment that assign it intrinsic worth, rather than mere instrumental value (LEOPOLD 1949; DEVALL and SESSIONS, 1985). For many, it is also a source of wonder and beauty and, in that sense, of value in its own right.

Whether or not one chooses to assign intrinsic value to the natural environment, most environmentalists do agree that, rather than centering purely on human concerns, a more appropriate ecological model of ethics means focusing on the *relation between* human beings and the natural world. It is when the *relationships* are out of balance – and included are those cases of heavy-handed technological manipulation of natural systems that ultimately compromise human and environmental health and safety – genuine disaster mitigation is at serious risk. Natural disasters are most fundamentally a social/political problem, rooted in the manner in which humans interact with their natural environment. Increasingly, the hazards literature emphasizes how development decisions made by society determine future disasters by placing us at risk (MILETI, 1999). The term "natural disaster" is somewhat of a misnomer, since the cause of disasters is often complex, and embedded in human decision making about one's proper place in the world.

Our worsening relationship with the natural world relates to natural disasters in two ways. Firstly, humans tend to deal with natural hazards by either ignoring them (for example, by building in floodplains) or by transferring risk to future generations by designing vulnerable systems or communities that will eventually suffer a disaster. The difficulties experienced in obtaining international consensus and approval of the United Nations Framework Convention on Climate Change, designed to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system is one good example of this at the global level. Secondly, our use of the environment for economic growth results in environmental degradation that often increases risk. Examples of this include climate change, devegetation of slopes resulting in more land and mudslides, and the paving of urban areas resulting in greater runoff and flooding.

Some of these ecological relationships are schematized in figure 1. In the center of the figure are two boxes with solid lines, which represent our human and natural environments. The human environment box is placed within the natural environment one, emphasizing the ecological perspective taken by this paper. Within the human environment box is a circle representing our interaction with those parts of nature that can potentially be resources for society, or hazards.

Component **A** represents that part of society vulnerable to nat-

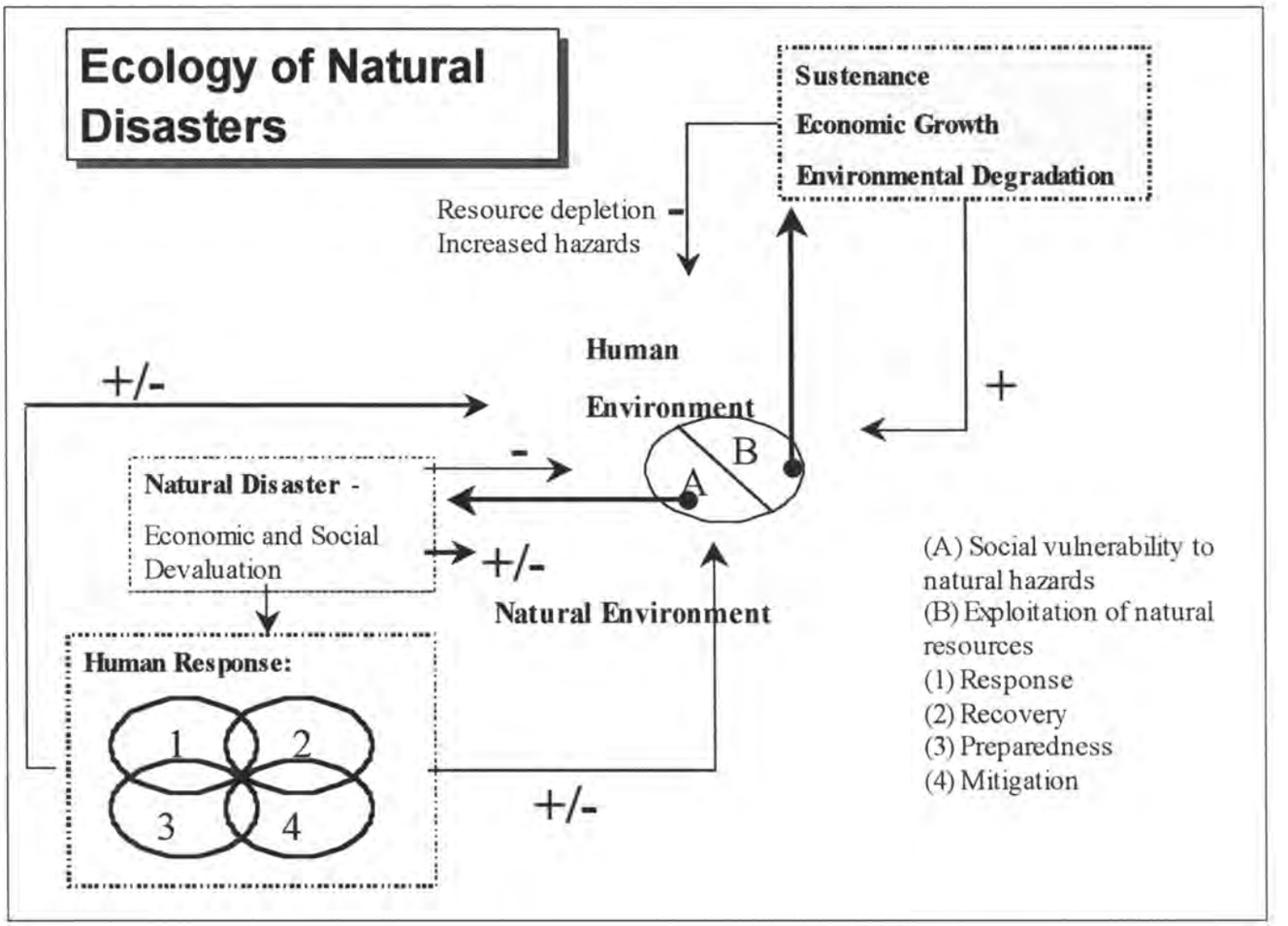

Fig. 1: This flow chart illustrates how the complex relationship between the human and natural environment contributes towards natural disasters. (*Source:* Adapted from Burton at al., 1993).
Note: The human environment is situated within, as opposed to separate from, the natural environment. Within the human environment, nature can be either a resource or a hazard. Where it is a resource (B) it leads to sustenance, economic growth, but also environmental degradation (the top right cycle). Therefore it can feedback in a positive way into the human environment, especially in the short term, but also in a negative way, where environmental degradation leads to increased hazards. Where the natural system is hazardous and social vulnerability exists, natural disasters can occur (the bottom left cycle). Such disasters have an immediate negative impact on society, but also trigger a complex cycle of human response that affects both the natural and human environments. These responses are intended to reduce vulnerability, but at times have increased it, and therefore the feedbacks are shown to be both positive and negative.

ural hazards, and those hazards. An example would be a city built near a fault line, and therefore subject to earthquake risk. This is essentially a simple representation of the "disaster pressure model" discussed in Blaikie et al. (1994), which defines risk as a function of both hazard and vulnerability.

Component **B** represents that part of nature which is a resource, and exploited by humans for sustenance and economic growth (such as harvesting forests for lumber, urban development, paving over land for urban development, or converting the natural landscape into agricultural land). The idea that nature is both a resource when it functions within our coping range, and a hazard when it exhibits extremes beyond that range has been explored, for example, by Burton et al. (1993, p. 32).

This flow chart illustrates how the complex relationship between the human and natural environment contributes towards natural disasters. The human environment is situated within, as opposed to separate from, the natural environment. Within the human environment, nature can be either a resource or a hazard. Where it is a resource (B) it leads to sustenance, economic growth, but also environmental degradation (the top right cycle). Therefore, it can feedback in a positive way into the human environment, especially in the short term, but also in a negative way, where environmental degradation leads to increased hazards. Where the natural system is hazardous and social vulnerability exists, natural disasters can occur (the bottom left cycle). Such disasters have an immediate negative impact on society, but also trigger a complex cycle of human response that affects both the natural and human environments. These responses are intended to reduce vulnerability, but at times have increased it, and therefore the feedbacks are shown to be both positive and negative.

From these boxes there are various arrows pointing in and out, with + and - signs beside them. Those signs are meant to represent the average direction of feedback, either positive (constructive to the system) or negative (destructive to the system). Clearly, there are value judgments inherent in these terms, and what one person may consider constructive, another may consider destructive. We suggest that the terms be interpreted with-

in the context of total resources within the system and complexity; greater resources and increased complexity would be reflected by a +. Therefore, a flux of resources from the natural environment to the social environment would be positive for the social but negative for the natural system.

"B" (exploitation of resources) leads to economic growth but also to environmental degradation (on average), and is represented by the dashed box in the upper right hand corner of the figure. This results in feedbacks into the human and natural environments. One leading to the human environment is positive, reflecting how the use of natural resources enhances our society. However, the feedback into the natural environment is negative, as our experience is dominantly that environmental degradation has resulted from resource exploitation. This feedback has the net result of increasing risk by altering the hazards themselves.

"A," where extreme natural events act as a trigger to vulnerable systems, leads to natural disasters. Disasters typically trigger an overlapping and complex cycle of human behavior, starting with response and recovery, but often also including preparedness and mitigation. The latter two activities do occur in a continuous fashion in theory, but experience has shown that changes in behavior occur most often following disasters, within what is often called a "window of opportunity."

Environmental values and the nature of the relationship between humans and nature play a crucial role in the nature of the feedback loops involving "A" and "B". Where nature is not valued, or when the links between human and natural environments are discounted, then ultimately hazards are made worse or vulnerability is increased, though short-term benefits may accrue to social systems.

Some mitigation programs appear to have been ineffective, or even counter-productive in the long term. Examples of this include the Canadian federal disaster relief program in parts of Quebec (BENOIT et al., 2003) and some aspects of the U.S. flood insurance program (LARSON and PLASENCIA, 2001). The reasons for this are many and complicated – some are political, some are cultural, and some are technical. For this reason the feedbacks from the Human Response box at the bottom of figure 1, to the Social and Natural Environments box have a ± sign.

Mitigation activities, in order to be effective, need to reduce vulnerability. There are many different ways we can be vulnerable, including physical, personal, geographical, structural, environmental, cultural, social, economic and institutional.[5] These vulnerabilities are often linked in complex ways; for example, a poor economy can lead to a lack of institutional capacity and a greater use/misuse of environmental resources, with consequent environmental degradation. These linkages lead to the notion that any strategy designed to mitigate risk needs to be very broad-based. In particular, they should encourage a use of the natural environment that does not degrade it in ways that make hazards worse.

Recommendations for future action

If mitigation issues are complex, grounded in a holistic system of eco-ethical relationships, then clearly, interdisciplinary analysis is called for. Furthermore, to resolve conflicting ethical value judgments and taken for granted assumptions that underlie the development of any environmental policy, it makes sense to expand the discussion of ethics beyond human-centered parameters to include broader ecological values.

Such a discussion requires cultural change and the development of a cohesive interdisciplinary community. If such a change is to take place within Canada, we believe that a coherent community of hazards people needs to be formed. At present, hazards research and application is fragmented, with people mainly working within their own organizational, professional or departmental stovepipes. For this to change, institutions and/or networks need to be strengthened or created to encourage cross-disciplinary research: and to regularly bring practitioners, policy makers and researchers together from both the public and private sectors to share information and perspectives. In particular, city planners, people involved in emergency management and insurance, climatologists, geologists and hazard and disaster researchers in government and universities (particularly from the social sciences), as well as representatives from native communities, should begin to work together in interdisciplinary ways.

One useful model for such an institution is the Natural Hazards Center at the University of Colorado, Boulder, which houses a large library that is accessible by any person interested in hazards, publishes journals and newsletters, facilitates networking and holds an annual interdisciplinary workshop. Within Canada, the Canadian Risk and Hazards Network, the Institute for Catastrophic Loss Reduction, Publics Safety and Emergency Preparedness, Canada, the Geological Survey of Canada, the Meteorological Service of Canada and the Canadian Centre for Emergency Preparedness all take on some of these functions, and have the potential to assume a much larger role given the mandate and additional resources. The structure and characteristics of networks and institutions that enable cooperative behavior for the common good, in order to avoid "social traps" such as discussed by Hardin (1968) in "The Tragedy of the Commons," is an important topic, but beyond the scope of this paper. The reader is referred to Ostrom et al. (2002) for more discussion on this topic.

More effective mitigation means changing the way people think about hazards. This cannot be done solely by implementing new policies, standards or laws, though those tools are extremely important (consider how much of the damage caused by Hurricane Andrew in August 1992, in Florida occurred because existing standards and laws were not adhered to). It can be advanced by the interchange of ideas and experience by people who care and work with hazards issues.

Almost two decades ago, planner Spenser Havlick advocated increased exchange of documentation and experience, not only cross-regionally but internationally. "There is a need for new natural hazards research," he wrote, "which takes into account proper long term planning periods and for more international exchange of building codes and specifications which have proven effective in both disaster resistance and cost over a reasonable payback period" (HAVLICK, 1984, p. 404). Still today, researchers are calling for "a commitment to mutual understanding and collaboration among academics, professionals and laypersons, who are hazard specialists and academics, professionals and laypersons who are urban specialists" (MITCHELL, 1999, p. 46).

Certainly, electronic listservs, conferences, advisory groups and research centers are important elements of interdisciplinary collaboration. However, Havlick raised an important point when he suggested that "the greatest and most lasting contribution to the reduction of risk from natural hazards comes from the universities, the academies and other centers where architects, engineers and planners are trained" (1984, p. 405). His survey of universities at the time revealed almost no interdisciplinary courses on hazards mitigation and preparedness, and little has changed since then. Unless we are educating our students about how to make linkages, any long-term hopes for holistic understanding of the ecology of disaster mitigation is at serious risk.

It is difficult to underemphasize the importance of broad perspectives in solving real-world problems, and until our educational systems and professional development encourage such, it is unlikely that much progress will be made in the mitigation of natural disasters. It has been said that "a way of seeing is also a way of not seeing" (Kenneth Burke in KLEIN, 1990, p. 182). Our personal experiences, our personal and disciplinary biases and

deeper underlying paradigms allow us to see mitigation from various, unilateral perspectives. It is only in a wider dialogue that collectively we can hope to evolve a broader, eco-ethical approach to disaster mitigation by moving our sights towards the greater whole.

Notes

1. It is a somewhat debatable point, whether these strategies are classified as 'modifying the hazard' or as 'modifying vulnerability.' For example, if you build a house on a flood plain, the house is vulnerable to flooding. If a dam is built so that the floodplain is changed, you have reduced vulnerability, but one could also argue that the hazard – the river – has been modified. For practical purposes the distinction is probably not important.
2. For a discussion of some of the contemporary interpretations of ecology, see Molles, Jr., 1999.
3. Frederick Clements, for instance, viewed ecosystems and the climax community as a complex organism – "a new kind of organic being with novel properties" (cf. Worster, 1985, 211). The community model itself was advanced by thinkers such as English zoologist, Charles Elton, who viewed ecosystems as functional models. By the early 20th century, English biologist Arthur Tansley moved toward an energy model of ecosystems, denying that they consisted of simply physical, mechanical elements but reflected complex energy flows. Our emphasis is on the theoretical importance of emphasizing fundamental, ecological relationships between human beings, living entities and biotic and abiotic environments.
4. Increased mitigation of risks from natural hazards has been addressed through Ontario's Emergency Readiness Act (Bill 148), which states that "Every municipality shall develop and implement an emergency management program," and through the Quebec Civil Protection Act (Bill 173), which requires municipalities to engage in risk identification, prevention and emergency response plans.
5. For a review on vulnerability, see, for example Anderson (2000), Hewitt (1997) or Blaikie et al. (1994).

References

ANDERSON, M.B. (2000), *"Vulnerability to disaster and sustainable development: A general framework for assessing vulnerability,"* in Pielke and Pielke (eds.), *Storms,* vol. 1 (New York, Routledge), pp. 10-25.

BASS, B. (2002), Personal Communication.

BENOIT, R., F. SIMON, and J. ROUSSELLE (2003), "The effectiveness of flood damage reduction measures in the Montreal region," *Natural Hazards* (in press).

BERKES, F. (1999), "Sacred ecology," *Traditional Knowledge and Resource Management* (Philadelphia and London, Taylor and Francis).

BLAIKIE, P., T. CANNON, I. DAVIS, and B. WISNER (1994), *At Risk – Natural Hazards, People's Vulnerability and Disaster* (London, Routledge).

BOOTH, Annie L. and Harvey M. JACOBS (1993), "Ties that bind: Native American beliefs as a foundation for environmental consciousness," in Susan J. Armstrong and Richard G. Botzler (eds.), *Environmental Ethics: Divergence and Convergence* (New York, McGraw-Hill), pp. 519-526.

BROWN, D.W., S.M.A. MOIN and M.L. NICOLSON (1997), "A comparison of flooding in Michigan and Ontario: 'Soft' data to support 'soft' water management approaches," *Canadian Water Resources Journal*, vol. 22, no. 2, pp. 125-139.

BRUNK, Conrad (1993), "Technological risk and the nuclear safety debate," in *Proceedings from a Workshop* (Ottawa, Ontario, Institute for Research on Environment and Economy), October 1-2.

BURBY, R.J. (2001), "Flood insurance and flood plain management: The US experience," *Environmental Hazards,* vol. 3, pp. 111-122.

BURTON, I., R. KATES and G. WHITE (1993), *Environment as Hazard* (2nd ed.), (New York, The Guilford Press).

CALLICOTT, J. Baird (1994), *Earth's Insights: A Survey of Ecological Ethics from the Mediterranean Basin to the Australian Outback* (Berkeley, CA, University of California Press).

China Online, 2003. http://www.chinaonline.com/refer/ministry_profiles/threegorgesdam.asp. Accessed July 7, 2003

CRICHTON, D. (2001), Personal Communication.

DEVALL, B. and George SESSIONS (1985), *Deep Ecology: Living as if Nature Mattered* (Salt Lake City, Peregrine Smith Books).

DORE, M.H.I. (2003), "Forecasting the conditional probabilities of natural disasters in Canada as a guide for disaster preparedness," in *Natural Hazards,* vol. 29, no. 2-3, pp. 249-269.

DOXIADIS, C.A. (1968), *Ekistics: An Introduction to the Science of Human Settlements* (New York, Oxford University Press).

ENVIRONMENT CANADA (2002), *Science and Environment Bulletin*, Issue No. 32 (September/October). Also available on the website: www.ec.gc.ca/science.

—— (2003), http://www.mb.ec.gc.ca/nature/whp/ramsar/df02s06.en.html. Accessed July 7, 2003.

ETKIN, D.A. (1999), "Risk transference and related trends: Driving forces towards more mega-disasters," *Environmental Hazards,* vol. 1, pp. 69-75.

GELMAN, Ovsei and Santiago MACIAS (1984), "Toward a conceptual framework for interdisciplinary disaster research," in *Ekistics*, vol. 51, no. 309 (November/December), pp. 507-510.

GUNDERSON, L.H. and C.S. HOLLING (eds.) (2002), *Panarchy: Understanding Transformations in Human and Natural Systems* (Washington, DC, Island Press), 507 pp.

HARDIN, Garre (1968), "Tragedy of the commons," *Science*, vol. 162, pp. 1243-1248.

HAVLICK, Spenser W. (1984), "The urgency of accelerated application of natural hazards research findings in human settlements," *Ekistics*, vol. 51, no. 308 (September/October), pp. 398-405.

HAUDENOSAUNEE ENVIRONMENTAL TASK FORCE (1992), *Words that Come Before All Else: Environmental Philosophies of the Haudenosaunee (*Task Force).

HEWITT, K. (1997), *Regions of Risk – A Geographical Introduction to Disasters* (Longman), p. 389.

HOFFMAN, S. (1998), "Eve and Adam among the embers: Gendered patterns after the Oakland Berkeley firestorm," in E. Enarson and B.H. Morrow, *The Gendered Terrain of Disaster: Through Women's Eyes (*Florida International University), pp. 55-62.

HOLLING, C.S and L.H. GUNDERSON (2002), "Resilence and adaptive cycles" in L.H. Gunderson and C.S. Holling (eds.), *op. cit.,* pp. 25-62.

INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES (2001), *World Disasters Report: Focus on Recovery* (Bloomfield, CT, Kumarian Press).

INTERNATIONAL MONETARY FUND (IMF) (2003), *"The IMF's poverty reduction and growth facility,"* http://www.imf.org/external/np/exr/facts/prgf.htm. Accessed July 10, 2003.

KLEIN, Julie Thompson (1990), *Interdisciplinarity: History, Theory and Practice* (Detroit, Wayne State University Press).

LARSON, L. and D. PLASENCIA (2001), "No adverse impact: New direction in floodplain management policy," *Natural Hazards Review,* vol. 2, no. 4 (November), pp. 157-181.

LEMAN, Alexander B. (1980), "Human settlements: Framework for disaster assessment," in *Housing Science*, vol. 4, no. 6.

LEOPOLD, A. (1949), *A Sand County Almanac with Other Essays on Conservation from Round River* (New York, Oxford University Press, 1949; reprinted in 1981).

MILETI, D. (1999), *Disasters by Design – A Reassessment of Natural Hazards in the United States* (Washington, DC, Joseph Henry Press).

MITCHELL, James K. (1999), "Natural disasters in the context of megacities," in James K. Mitchell (ed.), *Crucibles of Hazard: Mega-Cities and Disasters in Transition* (New York, United Nations University).

MOLLES, Manuel C., Jr. (1999), *Ecology: Concepts and Applications* (New York, McGraw-Hill).

NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION (NOAA) (2003), Atlantic Oceanographic and Meteorological Laboratory, Web Site, http://www.aoml.noaa.gov/hrd/hrd_sub/modification.html. Accessed Jan. 23, 2003.

O'BRIEN, Mary (2000), *Making Better Environmental Decisions: An Alternative to Risk Assessment* (Cambridge, MA, MIT Press, in association with the Environmental Research Foundation).

OSTROM, E., T. DIETZ, N. DOLSAK, P.C. STERN, S. STONICH and E.U. WEVER (eds.) (2002), "The Drama of the Commons," *Committee on the Human Dimensions of Global Change* (Washington, DC, National Academy Press), p. 521.

STEFANOVIC, Ingrid Leman (2000), *Safeguarding Our Common Future:*

Rethinking Sustainable Development (Albany, NY, State University of New York Press).

——— (2003), "The contribution of philosophy to hazards assessment and decision making," *Natural Hazards,* vol. 28, no. 2-3, pp. 229-247.

WHITE, G. (1999), "A conversation with Gilbert F. White," *Environmental Hazards,* vol. 1, pp. 53-56.

———, R.W. KATES and I. BURTON (2001), "Knowing better and losing even more: The use of knowledge in hazards management," in *Environmental Hazards,* vol. 3, pp. 81-92.

WORLD BANK (2002), *"Leadership capacity building for post conflict reconstruction."* http://www.worldbank.org/wbi/B_SPAN/sub_leadership_postconflict.htm. Accessed July 10, 2003.

WORLD METEOROLOGICAL ORGANIZATION (WMO) (1995), "Meeting of Experts to Review the Present Status of Hail Suppression," *World Meteorological Organization,* WMP Report No. 26, Golden Gate Highlands National Park, South Africa, WMO/TD No. 764.

WORSTER, Donald (1985), *Nature's Economy* (Cambridge, Cambridge University Press).

WYNNE, B. (1992), "Uncertainty and environmental learning: Reconceiving science and policy in the preventive paradigm," *Global Environmental Change,* vol. 2, no. 2, pp. 111-127.

Resettlement of development-induced displacees: Emerging issues

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The author's primary academic interest is to explore the various facets of, and processes in the nature and society interface. His background is in the area of resource and environmental management, with concentrations in environmental risk assessment, hazard and disaster management, and water resource management. He served as the President of the Canadian Association of Geographers, Prairie Division, and Vice President of the International Natural Hazards Society. Dr Haque is the founding President of the Canadian Risk and Hazards Network (CRHNet). He served as an advisor and consultant to several ministries of the provincial government of Manitoba, Public Safety and Emergency Preparedness Canada, the national government of Bangladesh, and United Nations agencies in the fields of social impact assessment, disaster mitigation and emergency management, community-based resource management, sustainable floodplain development and management, and water resource planning and program implementation. The text that follows is a slightly edited and revised version of a paper presented at the international symposion on "The Natural City," Toronto, 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics.

Introduction

"The forcing of communities and individuals out of their homes, often also their homelands, for the purpose of economic development" is termed as development-induced displacement by Pablo Bose (2003) and Bose et al. (2003). Development-induced displacees (DIDs) thus characteristically are different from the "voluntary" and "floating" migrants, as DIDs are forced from their homes or they move involuntarily. It is also important to distinguish DIDs from other types of involuntary migrants such as political refugees (who often face forced migration on short notice and assistance provided in such cases is reactive to refugee crisis) or environmental refugees and disaster-induced refugees (threats to lives and properties stemming from extreme environmental events rather than human actions). Large-scale physical infrastructure, which includes roads and highways, railways, dams and reservoirs, utility networks, urban and industrial development projects, often causes uprooting of massive sedentary populations for macro scale economic development. Such projects are aimed at improving living conditions of citizenry in general through national prosperity, although the displacements associated with them harm local people and communities and restrict their ability to continue with their normal livelihood. Unlike political and environmental refugees, migrants displaced by dam construction tend to stay in their country of origin and are commonly settled internally. The degree of uncertainty of development-induced displacees' future tends to be relatively high, particularly among the dam-induced displacees. These uprooted people do not have the option of ever returning to their place of origin, and cannot have a dream of regaining their original identity and cultural settings.

Worldwide scale of displacement and modeling

Since World War II, more than 20 million people have been displaced worldwide by strife, both cross border and international (BOSE, 2003; HAMPTON, 1998). However, the volume of dislocated people caused by economic development activities surpassed 100 million (McDOWELL, 1996). Notably, on average, 10 million people are uprooted by large-dam projects worldwide (CERNEA and McDOWELL, 2000).

Because DIDs are rooted in human actions for a so-called "greater cause," logistic, ethical, and social (such as instability, unrest, and civil disobedience) responsibilities concerning relocation lie with both individuals and institutions, primarily with governments. During the last 25 to 30 years, the field of resettlement studies has accumulated a systematic body of knowledge and theory that is both useful and provocative to planners and policy executives. The pioneering Scudder/Colson (1982) model is central to all these models and was based on several studies in Africa, particularly the Kariba Dam in Zambia.

It is suggested in this model that, in a free market setting, adaptation to forced settlement occurs in four demarcated stages:

- **Recruitment:** Involves the choice of people to be resettled, as many people may resist resettlement or may choose to migrate elsewhere on their own. In fact, only people with financial and logistical resources tend to voluntarily choose to relocate in the face of development-induced uprooting, and thus leave behind a population that would be forcibly resettled. The latter group thus represents a cohort with considerably diminished capital and human resources.
- **Transition:** With the actual removal of people and belongings, the transition stage commences and terminates with the successful adaptation to the new settings, as can be found in the reestablishment of economic systems and social and community networks. This stage commonly causes the most harm to people and the socio-cultural responses tend to be "conservative" as people are wary of risk taking. This in turn results in minimal cultural inventory restricted primarily to essentials and risk-averse stands on innovation, such as housing arrangements, new cropping techniques, and re-training for newer types of jobs.
- **Potential development:** People who are successful in reestablishing their system of livelihood gradually become involved

in experimentation, innovation, and risk-taking activities, and are open to alternative ideas and action plans.

- **Incorporation:** At this stage, the community at large will have attained normalized relations with government and other institutions (such as business and industry), and with the outside world in general.

Although the Scudder/Colson stage model of (institutional) response to involuntary resettlement is helpful to generalize the process, it is of little help to specify the complexities and problematic nature of development benefits and cost, particularly of the associated human and societal costs. Meeting people's basic needs and improving their living conditions through industrialization, enhanced trade, urbanization, and economic development in general is every nation's goal, which is founded upon the principle of a positive overall net benefit. It considers the penultimate national vision and goal. But such aggregate gain in most cases is achieved at the expense of immense local or regional human and societal costs that are not generally accounted for in the conventional cost-benefit analysis. Paradoxically, rather than bringing about positive change in the living conditions of people at the regional and local level, dam-induced displacements and the consequential effects have caused mass impoverishment for millions in many parts of the world. The avoidance or underestimation of a consideration of "extemalities" has resulted in "hands off" by the governments or institutions in dealing with impoverishment of relocates and social instability, as well as environmental degradation (KANBUR, 2002; DOWNING, 2004).

Professor Michael Cernea, a former World Bank advisor, observed and conceptualized the risk of impoverishment through development- induced displacement by offering a narrative model, in which he identified several critical dimensions of the model (CERNEA, 1990):

- **Landlessness:** families with customary rights (common rights), rather than with family title, are commonly uprooted; compensation in cash does not ensure replacement of lost land;
- **Joblessness:** farmers and private small enterprises may not be reestablished at all, causing massive unemployment;
- **Homelessness:** for many families, without resettlement programs by the authorities, the loss of shelter is never replaced;
- **Marginalization:** small land or resource-holders or low income families are further marginalized in terms of resource, income, etc.
- **Food security:** undernourishment due to chronic food insecurity is common among displacees;
- **Morbidity:** adverse health effects associated with uprooting are well documented;
- **Social disarticulation:** results from break down of kin systems and social networks, as well as from the break-up of authority systems and loss of leadership (also see DOWNING, 2004). Quantification of this aspect is difficult.

As a consequence of these emerging scenarios and the scholarly work of Cernea and other contemporary scholars, significant changes occurred in the development and planning approaches to large-scale infrastructure including dams. This has been observed more prominently among the donor agencies and subsequently among national governments than any other involved bodies. One of the best examples is that, conventionally, planning for resettlement of uprooted people did not exist because displacees were viewed and designated as obstacles to dam or infrastructure construction rather than recognizing them as victims as well as potential contributors to economic growth and prosperity. Such policy and planning vacuums caused relegation of the issues of forced displacement to the position of "necessary evil" for which ad-hoc treatment was tolerable by the authorities, on the one hand. On the other hand, insufficient resource allocation, underplanning for resettlement and rehabilitation, and poor execution of ad-hoc programs were common consequential effects.

Lessons from resettlement schemes in various parts of the world

There are no specific criteria available to assess success and failure of resettlement schemes. Resettlement is a multidimensional opportunity for the reconstruction of systems of livelihood and human settlements. These dimensions represent a development in the standard of living of those affected, as well as in the regional economy of which they are a part. The major goal of resettlement schemes therefore is to ensure that settlers are afforded opportunities to become established and socioeconomically self-sustaining in the shortest possible period. Such schemes also must take into account important developmental aspects, such as social and physical infrastructure, schools and health services, access to jobs, and housing allocations, especially to meet expanding needs of these components. In sum, to be successful, resettlement schemes should lead to a transfer of responsibility from settlement authorities to the settlers themselves.

Coburn et al. (1984), by analyzing the resettlement of displacees caused by earthquakes in Bingol province of Turkey, have identified three factors that largely determine the fate of a scheme:

- the physical environment of the new settlement,
- the relationship with the old village, and
- the capability of the community to develop itself.

Other studies from Latin America and the Middle East have substantiated these citations by identifying that

- site,
- layout,
- housing and, more importantly,
- displacees' inputs through direct involvement in decision making,

are the most important criteria. Global literature surveys suggest that, while all these criteria would reveal some degree of commitment to permanence in both a dwelling and a community, it is important to recognize that all are ultimately dependent upon a certain level of economic uplifting of the displacees in terms of employment, income, and assets. Opportunity and proximity to employment sources and social support and services have been identified as most important elements in making a resettlement project successful. Partridge (1989) in this context inferred that a crucial variable for assessing successful adaptation in the transition period is the reestablishment of the livelihood in terms of economic and social systems of production and consumption.

One of the most frequently cited causes of resettlement failure is the poor selection of site for resettlement, influenced chiefly by the fact that the welfare of the affected people and their preferences receive least priority. Rather, other factors such as selection of land that can be easily acquired, and/or public/state owned land is designated for convenience. Accessibility and topography favoring rapid construction for authorities seeking maximum efficiency in the use of resources and "speedy solutions" are also registered as reasons for poor site (in terms of ecological, social settings) choices.

Layout or design of the settlement has also been seen as a cause of abandonment of the sites by the resettlers. Monotonous, uniform designs and construction that represent an unfamiliar cultural value (urban, metropolitan) to the rural populations generate cultural conflicts, stress, and rejection. Such layouts often lack the required variety and individually preferred features. In such resettlement designs, the culturally constructed ritual spaces that are required by people in their surrounding environment do not exist in general. The failure of the layout to facilitate interaction with kin and old neighboring groups has also led to the abandonment of resettlement sites

in many parts of the world.

Poor housing design and construction also cause failure to resettlement schemes. Urban housing schemes are seen as being too small for large rural extended families. The loss of privacy is another frequent complaint. Traditional houses have evolved over time as functional to the needs of the household units, whereas the urban resettlement housing designs are not commonly suitable for domestic-subsistence activities (e.g. seasonal variations and necessary needs are not recognized).

Values and opinions of the affected people have traditionally been ignored in site selection, preparing the layouts, and designing the houses. Such lack of consultation and participation of the DIDs has given rise to poor understanding of the social and culturally derived needs and values, and more importantly, has missed the opportunity to reap the benefits of the DIDs intimate knowledge and long experience with the immediate environment. In Turkey (AYSAN and OLIVER, 1987), Brazil (WORLD BANK, 1987), and Peru (OLIVER-SMITH, 1977 and 1986), non-displacees and non-locals were hired to construct resettlement infrastructure, depriving the DIDs from gaining a sense of ownership and relevant new skills.

The significance of economic transition of DIDs cannot be underestimated. In the context of the Three Gorges Dam in the People's Republic of China, it has been estimated that over 1.2 million people will be uprooted. With the rising of the water level of the Yangtze up to 175 meters, 484,700 urban residents will be displaced (57 percent) and could be absorbed in comparable occupations. However, the challenge for planners is to facilitate reconstruction of the livelihood of rural DIDs (361,500 in 1,353 villages along the reservoir shores). The land-for-land policy has been used both in India (Narmada Valley project) and China earlier. Li Heming et al. (2000) reported that the majority (66 percent of respondents) of the relocatees regarded their farmland (in the steep, relatively infertile slopes) after relocation as "worse" or "much worse" and 12 percent reported it as "the same as" and 21 percent said they were "better off."

The strategy of settling rural migrants in urban areas through the help from finding relatives and friends and arranging for these migrants to enter the non-agricultural sector in general have been successful for the elderly populations in China. However, although government tried to settle younger rural migrants in urban economic sectors, their employment did not last very long (WU, 2004). A Canadian example can be cited here as an interesting lesson. In the mid 1990s in the Canadian eastern coastal regions, due to a moratorium on Cod fisheries, thousands of fishermen lost their livelihoods. The Canadian government initiated vigorous retraining programs to transform these massive human resources to suit for emerging urban, service sectors jobs that over time have been proven to be successful.

Glittenburg (1982; cited in Oliver-Smith, 1991) investigated reconstruction in four urban settlements, following the 1976 Guatemalan earthquake. The earthquake displaced thousands of families by destroying their houses and all of their personal possessions. The families could not stay close to their original settlements due to the instability of the terrain. In the face of such uncertainty, these working class families, with the help of students, organized a land invasion. Experiencing such a *fait accomplis*, the National Housing Bank (BANVI) agreed to buy the land and the local church agreed to build 1,500 houses, a health station, a primary school, a market, a church, and a park. The obligation of the participants was to take part in all decision making of the project, commit 3 weeks labor to house construction, and pay a mortgage of $8-10 per month. Today, it is one of the highly organized communities in Guatemala. The high level of organization, the dynamic nature of internal leaders, and external assistance that encouraged taking ownership were the key factors in ensuring the success of the project.

Policy and planning frameworks for mitigating displacement impacts

Michael Cernea (2000) and Theodore Downing (2004) have suggested that, although every negative counter-development effect of large dam construction cannot be prevented, many of the great risks can be minimized. Appropriate policy adjustments, planning mechanisms and tools and execution of effective programs are necessary to attain such goals. For involuntary resettlement schemes, four interrelated frameworks are said to be required:

– Policy framework
– Planning framework
– Organization framework
– Legal framework[1]

of which the first three are relevant to the Chinese context.

Policy framework

- The responsibility for relocating the groups affected by public projects lies ultimately with the government; the people who directly benefit from the project that causes displacement should share in solution-finding;
- Avoidance of forced displacement should be a policy-priority, and when unavoidable, its effects should be minimized through alternative solutions;
- The centrality of policy objective should be to assist resettlers to improve their former living standards and production levels or at least restore them;
- The policy approach should be changes from relief and assistance programs to full-fledged development programs;
- Land-for-land as well as cash compensation against losses are inadequate to reconstruct the livelihood of resettlers, therefore compensation mechanisms should be complemented by a "generalized safety net" measure (KANBUR, 2002);
- Overall, the equity concerns must be addressed in policy framework.

Planning framework

- Action plan for resettlement schemes must be an integral part of the project development process. Planning should begin by examining the options for reducing displacements as well as risks of impoverishment.
- The planning for displacement and resettlement should attempt to consult the affected population as much as possible, to involve its leaders and organizations, and to inform them of the overall project plans and their justification. This would minimize the gaps between authorities and DIDs.
- Resettlement planning processes should examine the acceptance rate for various options to minimize risks and facilitate organization and funding.
- A development-oriented plan for resettlement should attempt to improve the prior housing standards and the physical infrastructure and services at the new relocation sites, rather than allowing only for the same standards. Literature on resettlement has revealed that self-built houses are preferred by resettlers over authority or government built housing. Aysan (1987) studied resettlement schemes in Western Turkey, and noted that some degree of flexibility in dwelling structure and function was a key to their success. Residents were given single storey houses of 42 sq.m built on a grid layout by the state. Popular demand for variations from the state mandated design was not incorporated. However, the lot size was large enough to permit settlers to play an active role in altering and extending their houses. This was regarded as a sign of commitment and permanence.

- Displacees who move in groups, as part of a pre-existing community, neighborhood, kinship group, adapt better than individual family units in new locations. Whenever possible, in order to minimize social disarticulation, the settlers' social and cultural norms should be protected and supported.
- The resettlement plan should also account for "second generation" adverse environmental effects at the relocation sites (e.g. deforestation, social erosion, drainage congestion, and general overload of the ecological carrying capacity of the relocation areas).

Organizational framework

- Population relocation has often turned into implementation disasters in dam and other infrastructure projects, in part because the same agency which was responsible for building the dam was also given the charge of resettlement. Such agencies are specialized in the engineering and civil works and do not possess the professional skills to deal with agricultural and urban relocation. The agencies tend to relegate relocation affairs to the status of a low priority task.
- The Mexico Hydroelectric Project is a good example where major organizational modification was needed to improve resettlement planning (GLITTENBURG, 1982; OLIVER- SMITH, 1991). This was a World Bank assisted project, and two dams of the project displaced more than 5,000 people. The lowest level unit with the National Power Company handled previous resettlement schemes, which many of them so mismanaged they eventually caused outright cancellation of the resettlement schemes or delays of long duration. Such lack of organizational supports was seen in unclear objectives, inadequate planning, insufficient staffing and financial resources, and poor scheduling. The Company's reorganization efforts have eventually addressed these problems by creating a special social development division, with applied action research specialists in the team.
- Monitoring and on-going evaluation of the dislocation and resettlement processes should be a priority element in designing organizational framework. The specific but subtle risks that prevail with the affected families (malnutrition, increased morbidity and mortality, asset depletion, social disarticulation) need special staff who are trained to understand and capture them. It is particularly important to ensure that the monitoring and evaluation teams are not under the direct authority of those responsible for compensation or resettlement operation.

Concluding commentary

The era of large dam construction in the developed world is over. Such a change in the discourse of large scale public utilities development and construction of large dams is chiefly attributed to increased public awareness of the adverse environmental and equity effects on the most vulnerable population, and the resultant stringent environmental impact assessment requirement for receiving construction of license.

However, globalization of the world economy has generated new economic momentum in many developing countries of Asia and Latin America, providing new impetus to expedite economic growth process through large scale development projects. Most of these newly industrializing nations have a large population with high population density, many of whom are adversely affected by development-induced displacements. In the forthcoming years, dealing with DIDs will therefore remain a major development policy challenge for the newly developed nations.

The courageous steps that the People's Republic of China have taken in recent years in terms of a simultaneously focus on human safety through flood mitigation and generation of power for rapid manufacturing and service growth are commendable. Construction of the Three Gorges Dam is the realization of a century-old dream. However, two major constraints may undermine the benefits of such accomplishment:

- a failure in reconstruction of the livelihood of more than 1.3 million displaced people from the lower levels of the Yangtze valley; and,
- long-term environmental impacts from the changes in water level and river regimes, for example mercury accumulation.

Establishing a participatory decision-making process in the resettlement process, and providing alternative choices to the displacees certainly will improve the performance of resettlement schemes. As well, incorporation of a resettlement scheme as constituent parts of future power development and water resource management projects will address and mitigate the concerns that usually arise from uncertainty in planning and implementation.

Note

1. The fourth framework is the legal framework. Existing literature in this area is primarily based on private and common property rights and protection of individual rights under a democratically elected government. China being a centrally planned economy and unique in terms of its legal systems, a separate discussion on legal framework for the Chinese case is required.

References

AYSAN, Y. (1987), "Homeless in 42 m^2," *Open House International* 12, pp. 21-26.

AYSAN, Y. and P. OLIVER (1987), *Housing and Culture After Earthquakes* (Oxford, Oxford Polytechnic).

BOSE, P. (2003), "The rhetoric of participation and the reality of development-induced displacement," *EDID Working Paper Series,* Centre for Refugee Studies (Toronto, York University).

—— N. GARSIDE and R. ODDIE (2003), "The politics of participation: A dialogue on displacement, development and democracy," *EDID Working Paper Series,* Centre for Refugee Studies (Toronto, York University).

CERNEA, M. (1990), "Poverty risks from population displacement in water resources development," Development Discussion Paper no. 355, Harvard Institute for International Development (Cambridge, MA, Harvard University).

—— and C. McDOWELL (2000), *Risks and Reconstruction: Experiences of Resettlers and Refugees* (Washington, DC, World Bank).

COBURN, A.W., J.D. LESLIE and A. TABBAN (1984), "Reconstruction and resettlement 11 years later: A case study of Bingol Province, Eastern Turkey," in S. Schupisser and J. Studer (eds.), *Earthquake Relief in Less Industrialized* Areas (Rotterdam, A.A. Bakema), pp. 49-58.

DOWNING, T.E. (2004), "*Mitigating social impoverishment when people are involuntarily displaced.*" http://www.ted-downing.com/PAPERS/did1.htm. printed on March 18.

GLITTENBURG, J.K. (1982), "Reconstruction in four urban post disaster settlements," in F.L. Bates (ed.), *Recovery, Change and Development: A Longitudinal Study of the 1976 Guatemalan Earthquake,* vol. 2 (Athens, GA, The University of Georgia), pp. 634-707.

HAMPTON, J. (ed.) (1998), *Internally Displaced People: A Global Survey* (London, Earthscan).

HEMING, Li, P. WALEY and P. REES (2000), "Reservoir resettlement in China: Past experience and the Three Gorges Dam," *The Geographical Journal* 167 (3), pp. 195-213.

KANBUR, R. (2002), "Moving targets: Displacement, impoverishment, and development," *Resettlement News* (January).

McDOWELL, C. (ed.) (1996), *Understanding Impoverishment: The Consequences of Development-Induced Displacement* (Providence, RI, Berghahn Books).

OLIVER-SMITH, A. (1977), "Traditional agriculture, central places and post-disaster urban relocation in Peru," *American Ethnologist* 4, pp. 102-116.

—— (1986), *The Myrtured City: Death and Rebirth in the Andes*

(Albuquerque, The University of New Mexico Press).
—— (1991), "Successes and failures in post-disaster resettlement," *Disasters: The Journal of Disaster Studies and Management* 15 (1), pp. 12-23.
PARTRIDGE, W. (1989), "Involuntary resettlement in development projects," *Journal of Refugee Studies,* 2, pp. 373-384.
SCUDDER, T. and E. COLSON (1982), "From welfare to development: A longitudinal framework for the analysis of dislocated people," in A. Hansen and A. Oliver-Smith (eds.), *Involuntary Migration and Resettlement: The Problems and Responses of Dislocated People* (Boulder, Westview Press), pp. 267-288.
WORLD BANK (1987), *Brazil-Itaparica Resettlement and Irrigation Project,* Staff Appraisal Report (Washington, DC, The World Bank).
WU Ming (2004), *"Resettlement problems of the Three Gorges Dam: A field report by Wu Ming"* (Berkeley, CA, International Rivers Network). http://www.im.org/programs/threeg/resettle.html. printed on March 15.

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"The Natural City" Symposion – Presentations and discussions

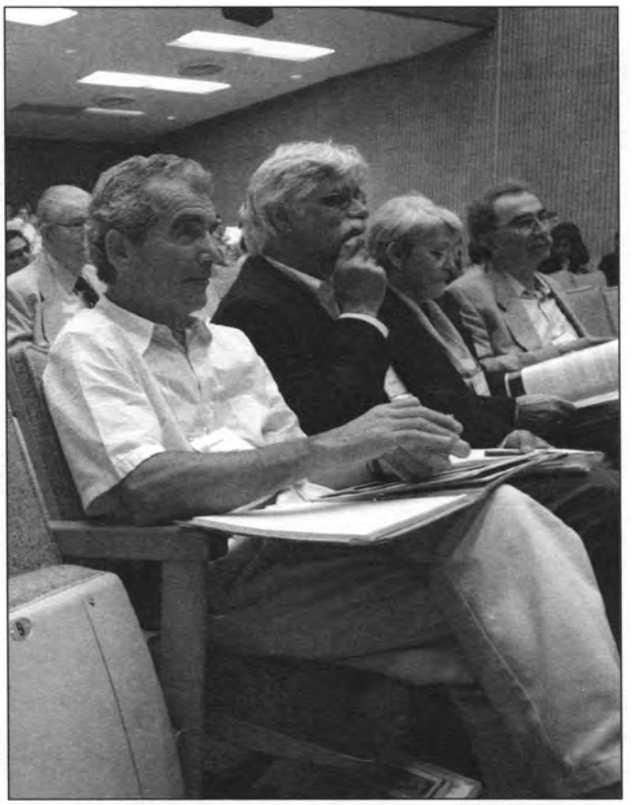

Fig. 1: From left to right: Arny Wise (Canada), Jurg Lang, Margery al Chalabi and Suhail al Chalabi (USA) on North American issues.

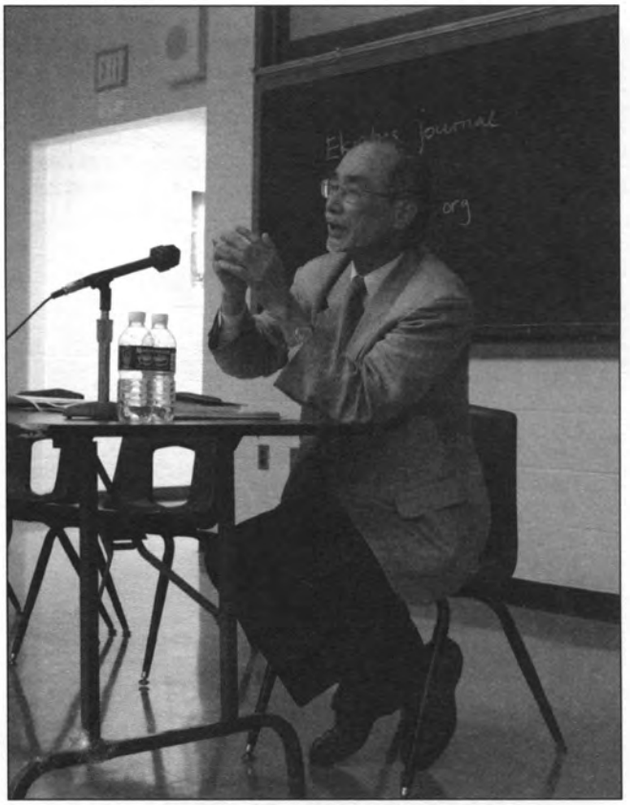

Fig. 2: Takashi Doi on Japan.

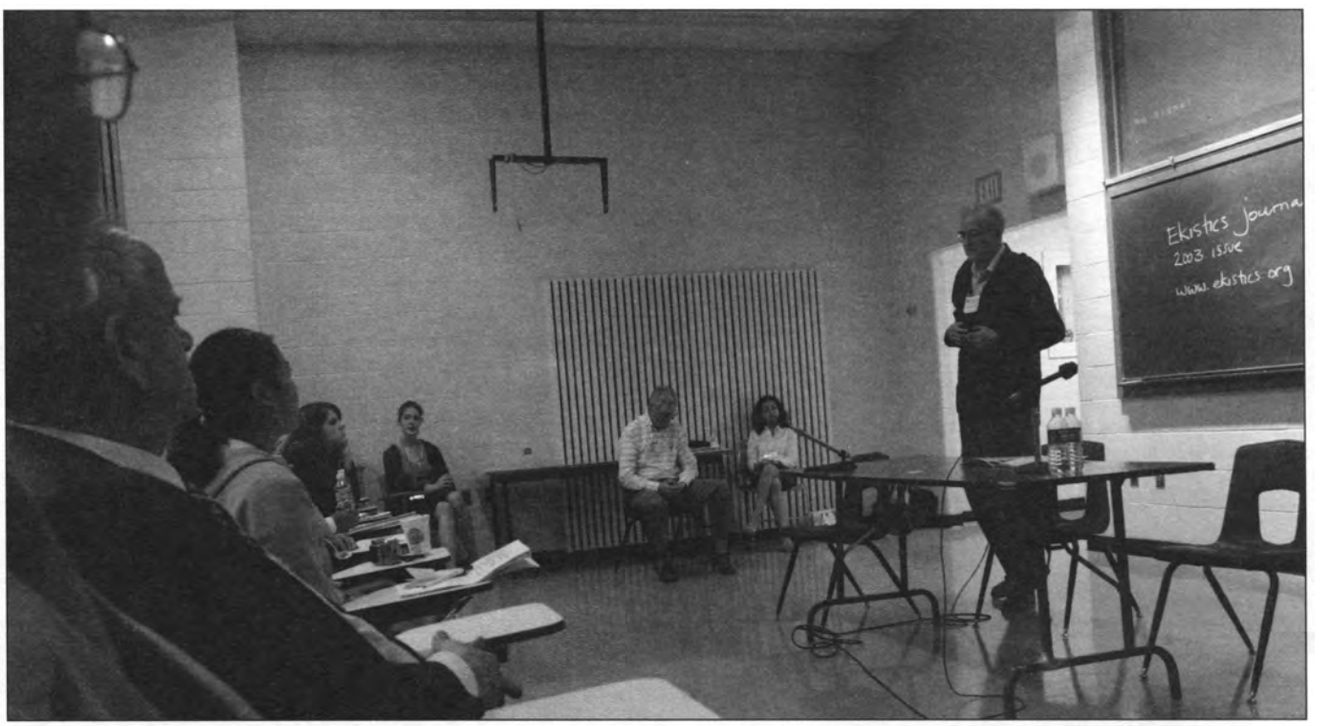

Fig. 3: Alexander B. Leman (Canada) on Housing in India. Sitting in the center, Tom Fookes, Chairman of the Session.

The city at the end of the cheap-oil era

Klaus Illum

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Introduction

Our cities and their suburbs are the habitats of motorcars feeding on oil. Motorcars occupy the public space and fill the air with their exhaust gases. Therefore, I was surprised to see that the motorcar and the prospects for the future survival of this species do not seem to be a main concern to be addressed at this symposium. The documentary *The End of Suburbia – Oil Depletion and The Collapse of The American Dream*, distributed as a DVD, has drawn attention to the fundamental problems facing cities worldwide. However, I shall now seek to draw your attention to these problems: problems which are repressed in the media and non-existent on the public political agenda because the coming decline in oil supply has such dire consequences for the prospects for the future of consumerism that few dare to confront reality. The head of the ostrich is securely buried in the sand.

The modern nature of cities

I have been wondering about the connotation "Natural City." In conventional modern Western thinking, *Nature* is what is found in natural parks – apart from roads, parking lots and signposted trails – i.e. what is not made and arranged by humans. In contradistinction, a *City* is an agglomeration of human artefacts arranged for human purposes. In nature, life in each particular local domain is nourished through a multitude of internal food-chains, sustained by sunlight and precipitation. In a city, life is sustained by food and materials imported from the surroundings. Thus, in the conventional framework of modern Western thinking, a city does not belong to nature. It is *per se* unnatural.

However, this conventional conceptual distinction between *Nature* and *City* and between human activities and the environment crumbles when confronted with the physical and biological realities of modern life on earth. Between the cities and the artificial natural parks, there is nowadays nothing which is not governed by humans and their machines. There is no nature and no environment of which we and our machines are not integral parts. Like ant heaps and termite nests, cities are integral parts of nature – alas, by far those with the most heavy impacts on all other parts of the ecosystems. What is called "environmental protection" is the protection of the conditions of life on earth in all its diversity. "Life protection" would be a better term.

I presume that "Natural City" should be interpreted in this conceptual context, as in *Natural Capitalism*, the title of the book by Paul Hawken and Amory and Hunter Lovins, published in 1999. In this sense, a city should be a sustainable physical and biological component of the ecosystem to which it belongs, in future regulated by a new economy which governs its development and activities under the constraints of life protection and limited resources which, most certainly, is not the case for the cities of the second half of the 20th century.

We must keep in mind that the second half of the 20th century bears no resemblance to any earlier period in the history of the Earth and that therefore no reference to history is relevant to the analysis and understanding of the problems we face today. Columbus could not foresee what was ahead but he did have a compass and the stars of the firmament to help him to set his course and estimate the latitude. Setting out for our voyage through the 21st century, we have no such fix-points for our navigation. We are, in fact, at a singular point on the trajectory of the development of human cultures.

Never before did the world's population grow from 2 to 6 billion over half a century. Never before was it a regular experience for millions of people to watch from above the myriads of motorcars and trucks circulating on motorways around a city when their plane approached the destination of their holiday or business trip. Never before were so many new urban areas, roads, motorways and airports built. Never before did agricultural and industrial production and international trade grow exponentially to the levels of the present economy. And never before did humans have the power to exhaust the fish stocks in the seas and to change the climate.

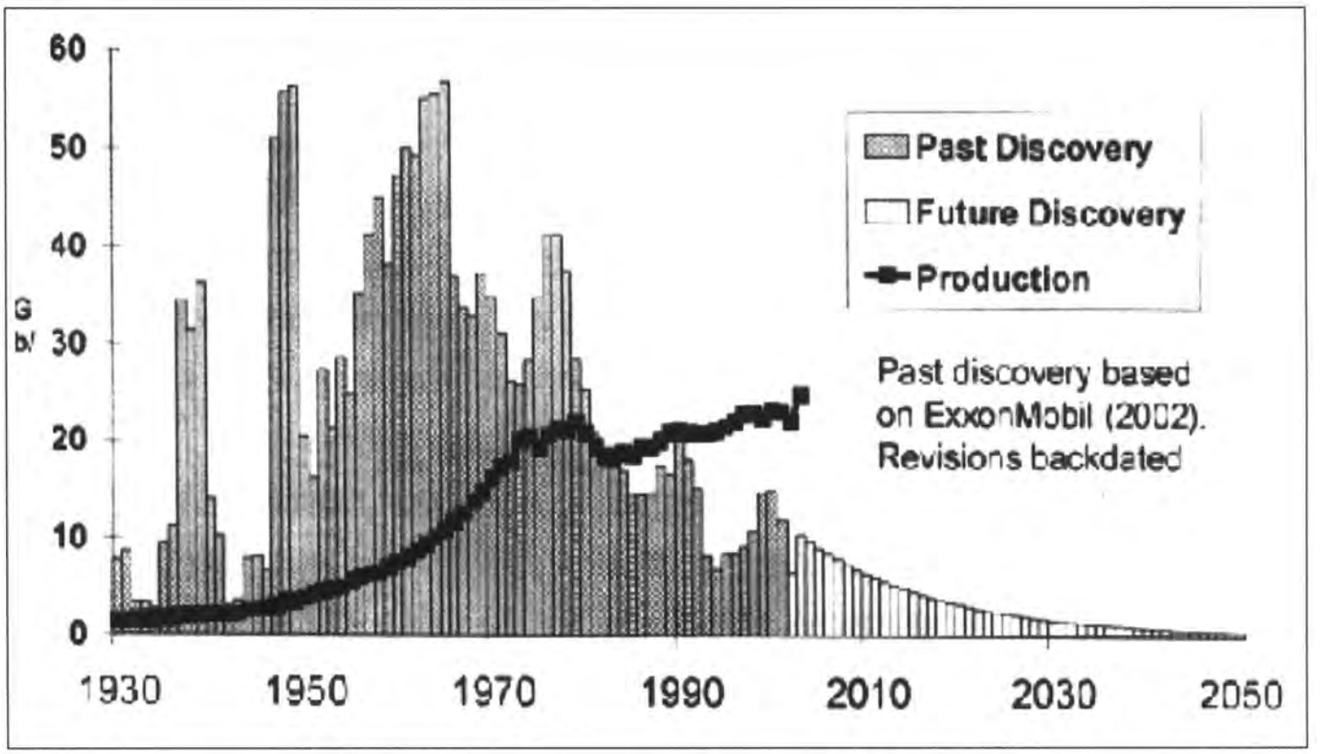

Fig. 1: The growing gap. (*Source:* ASPO Newsletter. www.peakoil.net).

Obviously, this explosive economic growth, which in all respects has changed the world, was based on abundant supplies of cheap fossil fuels: coal, mainly for electric power generation; oil and gas mainly for industries and for the heating of buildings; and petrol and diesel for the millions of internal combustion engines in cars, trucks, buses, airplanes, tractors, ferries, cargo ships and fishing boats.

Had large oil reserves not been found in the 1950s and 1960s (fig. 1), the basic infrastructures of the industrialized societies – the physical structures and transportation networks of the cities, the industrial production networks, the mechanized agricultural production – would not have been as they are today. Also, the migration of millions of people from rural areas to the megalopolises in the Third World was conditioned by oil for the transportation of food and other basic necessities to these huge, overcrowded habitats.

We now live in a world whose cities in all respects depend on ample supplies of cheap oil. A new "nature" is dominated by 600 million cars and sports utility vehicles (SUVs), millions of trucks, and hundreds of thousands of airplanes – including bombers and fighters – which consume 80 million barrels or 12 million cu.m of oil every day and emit 30 million tons of CO_2 in the process. If the amount of oil consumed in one day were filled into oil drums, the array of oil drums placed with one foot between each of them would span the Earth at the equator. The frightening prospect is continued exponential growth from this already excessively high level of consumption.

Limits to growth

The nature of exponential growth is not widely appreciated even though the illustrative water hyacinth example is well known. Imagine a water hyacinth which multiplies at such a rate that one plant becomes three in five days (fig. 2a). Assume that in the course of 10 years 10 percent of the surface of a big lake has

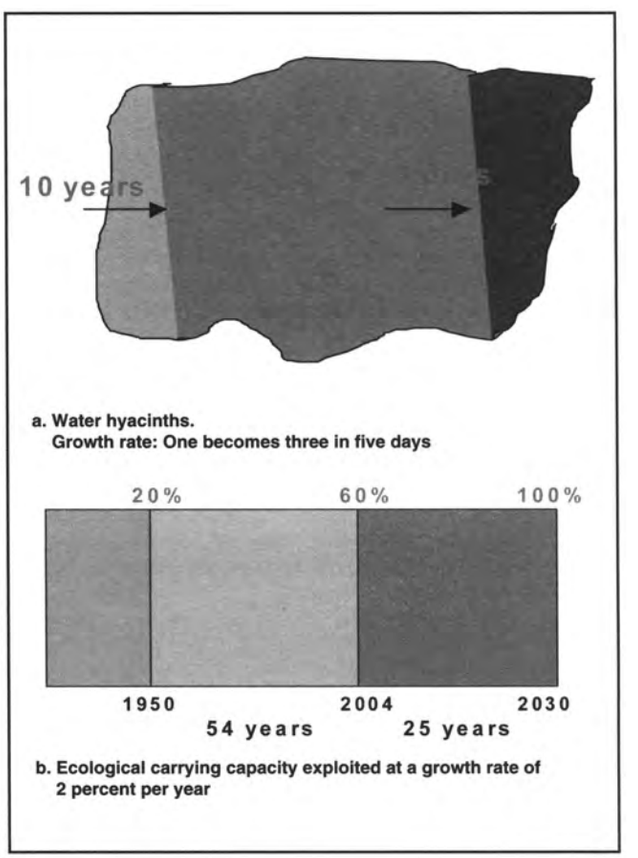

Fig. 2: Limits of growth.

become covered by such plants. After only 10 more days, 90 percent of the surface will be covered.

Now assume for the sake of argument that, in 1950, human societies had exploited 20 percent of the earth's sustainable ecological carrying capacity (fig. 2b). Then, at a growth rate of 2 percent per year, 60 percent would now be exploited and 100 percent would be reached 25 years from now. Thus, there are limits to growth and, at the present level of environmental impacts and resource depletion, we approach the limits at a rapidly growing rate; 80 percent of the world's population lives under severe limitations. It is a matter of one or two decades before the affluent countries reach the limits.

Oil is a limited resource. The bulk of the reserves now being depleted were found before 1980. We will not run out of oil for a long time but, at the present exponential growth in global oil consumption of more than 2 percent per year, oil demand may surpass oil production capacity within one or two decades as production levels peak and subsequently begin to decline irrevocably.

Continued growth in the supply of oil implies that no competitive alternatives to oil will be introduced on the market on a large scale – otherwise the growth in supply would cease as demand decreased. A consumption growth rate of 2 percent per year (fig. 3) means that 20 years from now, consumption will be 42 billion barrels per year as against the 28 billion barrels today. It takes an enormous increase in the number of piston engines, jet engines and oil boilers to bring about such an increase in consumption: one may expect one billion oil-powered motorcars on the world's roads instead of 600 million today, and millions of additional oil-powered trucks, tractors, harvesting machines, ships and airplanes. Moreover, it takes many more miles of asphalted roads, parking lots, and runways to accommodate all the additional vehicles and aircraft needed to consume 42 billion barrels per day.

As long as supply can meet demand, the market price of oil may remain low. In that case, growth in consumption – i.e. the growth in the number of oil-based machines and facilities – will continue until production can no longer meet demand. Thus production capacity will peak while demand is still growing, whereupon the oil price will surge in a seller's market with no swing producers to balance supply and demand. Under such circumstances, the peak situation becomes more catastrophic the longer the peak is postponed.

In short, if a growing world economy is fuelled by ever-growing supplies of cheap oil, the economy will become technologically ever more dependent on cheap oil. Hence, when the peak occurs, the economy will be technologically unprepared for the decline in the supply of its most vital resource.

Adapting the economy to a decline in oil consumption

The conventional wisdom of the prevailing economic theories relies on the axiom that worldwide economic growth which implies continued growth in the production and consumption of energy-consuming hardware can continue for an indefinite length of time. It is assumed that market forces will ensure that new resources and new technologies will always be at hand when access to the resources upon which our societies depend becomes restrained and present technologies, therefore, become obsolete.

History shows that man has hitherto succeeded in making life easier by means of new energy sources and technologies, from

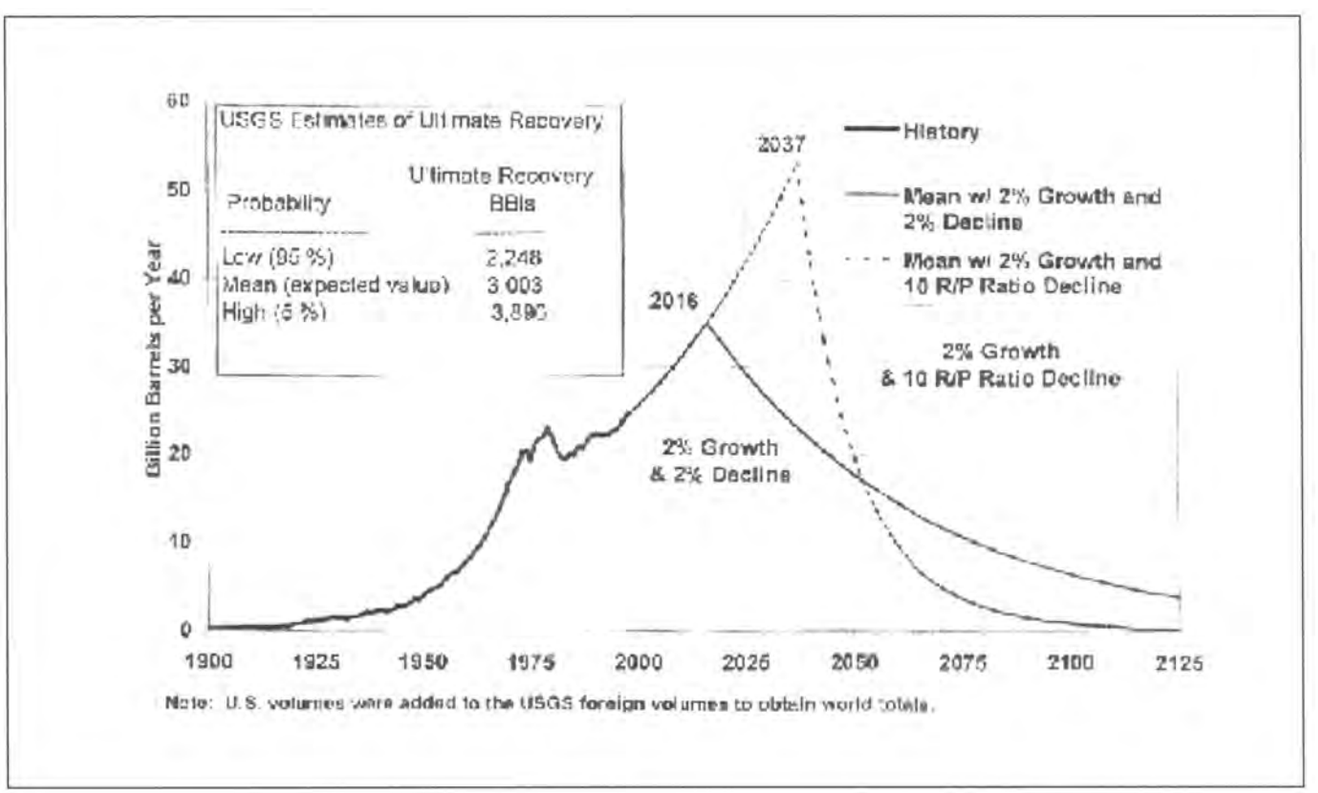

Fig. 3: Annual production scenarios with 2 percent growth rates and different decline methods. (*Source:* US Department of Energy, Energy Information Administration (EIA), 2000).

manpower to horsepower and row boats to sail ships; from horsepower and sails to coal-fired steam engines; from steam engines to oil-engines. However, as we now come to the end of the cheap-oil era, there is nothing in sight which is so easy and cheap to get, handle, store, and to use in cars, buses, trucks, tractors, ships, and airplanes as oil from oil wells.

The low cost of oil has allowed the development within a few decades of a world economy which is based on extravagant and wasteful use of this unique, most valuable fuel and thus has depleted its most precious resource base much faster than long-term economic considerations would justify. No market forces will bring about any easy and cheap substitutes for oil.

Considering what it takes to adapt the economies of the affluent countries to a decline in oil consumption, it should be recognized that it is not a question of replacing fossil oil by other fuels, renewable or non-renewable. At the present level of oil consumption, there is no substitute for oil. The task to be accomplished is the dismantling of the oil-technological complex developed over the last 50 years in a regulated manner.

In the first round, the objective must be to ensure that the demand for oil peaks before the oil production capacity peaks. Therefore, it is folly to invest hundreds of billions of dollars every year in the next decades in oil production on the one hand and oil-consuming machinery on the other, desperately seeking to climb the ever steeper slope of increased oil consumption, which ends at a cliff. Instead, a substantial part of these thousands of billions of dollars should be invested in the dismantling of the oil-technological complex so as to ensure that oil demand peaks before oil production capacity peaks.

In the market economy, the only way to pursue this policy is to tax oil consumption so as to ensure that the consumer price grows by something in the order of 15 percent per year over the next 10 years in order to gradually adjust the economy to high oil prices, instead of waiting for the price to soar in a world economy which has, in the meantime, become even more addicted to oil.

The restoration of the city

Imagine being a town planner in a city where gas at the gas station is progressively taxed so that the price increases to 10 dollars per gallon over a 10-year period and that the taxation revenue is allocated to the construction of energy-efficient, rapid and comfortable means of transportation, such as modern trams, trolley buses, local trains, and footpaths and bicycle lanes lined with trees and flowers where voices and birds are heard instead of the noise of cars. Imagine creating, in this way, a new kind of economic growth and useful employment in the restoration of a city after the occupation by motorcars, instead of transferring more and more resources to the motorcar industry and the oil industry and more and more capital to the oil-exporting countries until one day the gasoline price surges to 10 dollars per gallon anyway.

If this is unrealistic, wishful thinking, it is hard to see how the Natural City should emerge, except from the ruins of the habitat of the motorcar. It must be realized that, before those who are young today retire, most motorcars will be scrapped motorcars in any case. Instead of lamenting this state of affairs, it should be seen as an opportunity to restore the city as a natural human habitat.

It is hard to accept that the lavish motorcar and what it stands for as the emblem of vulgar consumerism should constitute the ultimate achievement of human invention and cultural development.

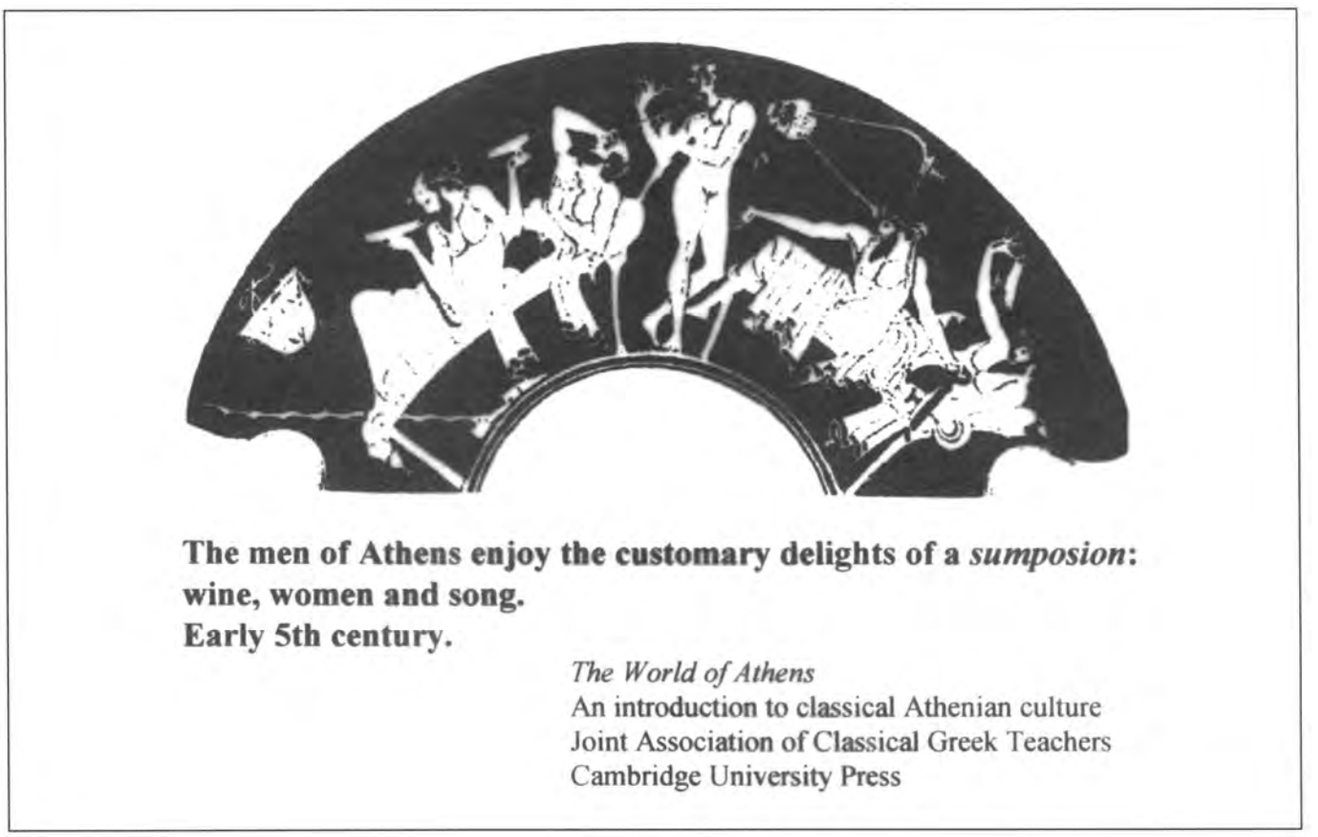

Fig. 4: There is a life without motorcars. (*Source: The World of Athens, An Introduction to Classical Athenian Culture,* Cambridge, Cambridge University Press, Joint Association of Classical Greek Teachers).

The culmination of human development?

Looking back on the multitudes of cultures in which religions, philosophies and arts have developed in the preceding millennia, it is hard to accept that the history of human development should culminate in the affluent countries' industrial growth culture where people as consumers serve to sustain economic growth with no other purpose than growth itself. Hopefully, the unprecedented technological capabilities we have achieved can be used not only to produce more and more superfluous material products and immaterial services which, only at great advertising costs can be sold to the consumers whose incomes depend on their employment in the industries which produce those products and services. Let us also not forget to mention the production of modern weaponry used to safeguard the resource bases of this production-consumption complex.

The terrifying scenario is that no serious political actions are taken to curtail oil consumption, and that when oil supply stagnates and begins to decline, the affluent countries will, for some years, be able to sustain their consumption either because they can pay a high price for crude oil or because they take military control of the remaining oil reserves in the Middle East, thus leaving the less affluent and the poor countries – including China, India, and the Latin and South American countries – to survive with rapidly decreasing supplies of oil for which they will have to pay a steeply growing portion of their already disproportionately small incomes. To uphold, for some years, such an apartheid in the global community, further fortification of the affluent countries and their military outposts is needed. That implies unprecedented militarization and the renunciation of any aspiration of a development towards global equality. In the affluent countries, the problems will be aggravated with no sustainable solutions in sight.

It takes a revolution in political and social thinking and in architectural design to restore a city to become a pleasant human habitat with few motorcars and it takes more technological ingenuity than to land astronauts on Mars (fig. 4). So, it is a worthy objective to restore our cities and thereby reduce oil consumption in the affluent countries by 50 percent before the Americans land on Mars. Success will mark a culmination in human culture.

The role of the university in city planning: Cleveland's Lakefront Redevelopment Plan

Wendy Kellogg and Kathryn Wertheim Hexter

Wendy A. Kellogg is an Associate Professor of Urban Planning and Environmental Studies. She earned her Ph.D (City and Regional Planning) at Cornell University in 1993. Her major fields of research interest are citizen participation, urban and regional sustainability, neighborhood redevelopment, and Great Lakes water quality and land use issues. She has published analyses of Great Lakes water quality planning programs and citizen participation in neighborhood-based environmental planning. Her research projects have included an environmental history and inventory of a neighborhood in central Cleveland, Ohio, the role of local decision makers in coastal and watershed protection, and the role of training programs in shaping local decision-maker behavior toward coastal management. Dr Kellogg was an Ohio Campus Compact Learn and Serve Fellow in 1998 and a USEPA-funded Fellow at the CSU Program on Risk Analysis in 2000-2001. She currently is a research associate of the Great Lakes Environmental Finance Center at Cleveland State University. She was a member of the Ohio Lake Erie Commission Blue Ribbon Taskforce on Balanced Growth in the Lake Erie Basin in 2001-2004 and is currently conducting research in support of that state program. Dr Kellogg teaches courses in urban planning, environmental planning, environmental policy, and urban theory.

Kathryn Wertheim Hexter, Director of the Levin College Forum Program since 2000, joined the Maxine Goodman Levin College as a public policy analyst on housing and energy issues in 1989. The Forum brings together the university and the community to address critical public policy issues that impact Northeast Ohio, the state and the nation. She also manages the Thomas F. Campbell, Ph.D Exhibition Gallery that houses exhibits that complement special forum programs. A planner and public policy analyst, Ms Hexter has over 25 years of experience managing and directing projects and evaluating programs in the areas of housing policy, neighborhood development, low-income energy assistance, city and regional planning and civic engagement. She has worked extensively with federal, state and local governmental, philanthropic and non-profit organizations. Since 1998, she has also directed the evaluation of the Sisters of Charity Foundation of Cleveland's Affordable Housing Initiative and conducted related research about the supply of affordable housing in Cuyahoga County. Prior to joining Cleveland State, Ms Hexter served in government and community affairs positions at East Ohio Gas Company and as a planner with a local consulting firm. With David C. Sweet, she is co-author of the book Public Utilities and the Poor: Rights and Responsibilities, *Praeger Publishers, 1985, and co-editor (also with David Beach) of the book*, The New American City Faces Its Regional Future, A Cleveland Perspective, *Ohio University Press, 2000. Ms Hexter holds a bachelor's degree from Washington University in St. Louis and a masters degree in City and Regional Planning from Harvard University.*

The text that follows is an edited and revised version of a paper presented at the international symposion on "The Natural City," Toronto, 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics.

Introduction

We suggest in this paper that universities, through a broad definition of "education," can more completely fulfill their mission and more fully support the principles of democratic governance by playing a role in public decision-making processes. This paper describes how the Maxine Goodman Levin College of Urban Affairs at Cleveland State University adopted and implemented this broadened educational vision by developing a two-year process to encourage and inform public discussion about one of the key decisions facing the entire Northeast Ohio region in the 21st century: the future of Cleveland's lakefront and urban river valley. The university was responding to growing public concern that while many publicly and privately generated plans had been proposed for greater Cleveland's waterways and their adjacent lands, few opportunities had been offered for direct and meaningful public input to shape these important planning decisions.

We first provide a framework for understanding the urban university's role in civic planning processes and raise questions concerning its scope. Next, we use the case study of the Levin College Forum Program, which was created in 1999 to bring the university and community together to address the most pressing issues facing the Northeast Ohio community. Through the Forum Program, the university worked with a number of community partners to develop *Northeast Ohio's Waterways*, a series of public forums that facilitated interaction among local citizens, stakeholders, and decision makers. We also engaged decision makers in a dialogue about public input in planning decisions. We use the Ekistic Grid (*The Ekistic Index of Periodicals*, 2004) to summarize the type of knowledge we sought to convey in order to stimulate discourse in these forums. We then present the results of the initiative, assessed through a survey and interviews of participants, which asked them to reflect on the difference the Forum Program made. Finally, we discuss the lessons learned from our efforts to "push the envelope" of university involvement in the public planning process.

The university and public planning processes

The foundation of democratic governance is an educated and engaged citizenry. As James Madison, a founder of democratic government in the United States, said,

> A popular Government, without popular information, or the means of acquiring it, is but a prologue to a farce or a tragedy, or perhaps both. Knowledge will forever govern ignorance: And a people who mean to be their own Governors, must arm themselves with the power which knowledge gives (Letter to W.T. Barry, 1822, U.S. Congress 1865, p. 276).

If participation in public decision-making processes is valued as a vital part of a modern civil society, the end purpose and opportunities for such engagement are nonetheless problematic (BENEVISTE, 1989; DAY, 1997). As Boyer (1991), an educator concerned with the relationship between the university and society, noted: "Many argue that it is no longer possible to resolve complex public issues through the democratic process because citizens are not sufficiently informed to debate policy choices of consequence" (p. xv). These concerns would apply both to administrative and electoral processes (the latter beyond the scope of this paper).

In the last 30 years, administrative agencies at local, state, and federal levels in the United States have been encouraged through law and executive order to engage citizens in various stages of public decision-making processes. This engagement, ranging from public meetings for information dissemination to delegation of decision-making authority (ARNSTEIN, 1969), offers citizens an opportunity to contribute valuable information (BURKE, 1979; BARBER, 1981; RICH, 1986) and build political skills and power (ARNSTEIN, 1969; FISHER, 1993). The particular type of participation is usually a function of the objectives of the agency, the capacity of citizens for participation, and the level of commitment from both the agency staff and public (DAY, 1997; KELLOGG, 1998; KING, FELTEY and SUSEL, 1998; KWEIT & KWEIT, 1987). A well-designed and managed public participation process that is clear about the relationship of administrative decision making and democratic participation can achieve several goals:

- incorporate public values into decisions;
- improve the substantive quality of decisions;
- resolve conflict among competing interests;
- build trust in institutions;
- educate and inform the public; and,
- allow citizens to gain skills for political participation

(BEIERLE & CAYFORD, 2002; ETZIONI-HALEVY, 1993; PATEMAN, 1970).

The potential for universities to support citizen participation in the public planning process is great. While the university is "without agency" (HOVEY, 2001) for making planning decisions, it can improve the level of planning literacy and help achieve goals of public participation by contributing to the information base available to citizens and decision makers. The university can and should reach beyond a one-way conveyance of the results of scholarly research to those outside the institution and beyond education of students in a formal classroom setting. We were guided by a model of more engaged interaction with citizens and decision makers designed to discover and generate a shared knowledge base about planning issues and the function of planning in public decision making (FISHER, 1993).

We suggest that by working in partnership with public institutions "with agency" the university can enhance public planning processes through several roles – as

- an advocate for enhanced knowledge;
- an advocate for involving the public;
- a convener to encourage public dialogue; and,
- a repository of public memory.

- As an advocate for knowledge, the university can use its research and teaching to enhance the knowledge base for public decision making through university-generated research and analysis. Bringing knowledge to action can improve the quality of decisions when transferred in the context of a dialogue between actors outside the university, hopefully leading to a synthesis of new knowledge (FRIEDMAN, 1987).
- The university can also encourage better planning by supporting opportunities for the public voice to be heard in public processes. The university can help to educate citizens and decision makers about the value of planning itself and develop a "constituency" for informed and open planning (ZIEGLER, 1995). Here the university can engage the lead planning agency, thereby influencing the planning process in terms of the level and kind of public input.
- In cases where a public or private planning entity may be seen by the public as biased, or where it may be difficult for a public entity to bring competing interests to the table, the university can act as an impartial convener – impartial as an institution to the outcomes of the public planning process while an advocate for bringing a greater variety of participants and knowledge to bear on public problems. The university, without power and authority but with prestige and leverage (MAZEY, 1995) is often in a unique position to bring together stakeholders with decision makers who may have no history of working together (PERLMAN, 1995). The university can be a forum for the discussion of ideas, a "central ground for brokering and debating ideas" (CISNEROS, 1995, p. 8).
- Finally, the university can serve as a repository of ideas and their generation through public processes, ensuring a public memory that is accessible for future members of the university and the broader community. Preservation of a variety of ideas is at the core of the university's purpose (BOWEN and SCHWARTZ, 2004). Table 1 presents these possible roles of the university in public planning processes.

Table 1
University role in public planning process

Role of university	University activities	Relevance to public planning process
Advocate/facilitate enhanced knowledge for public decision-making processes	Disseminate results of research to decision makers and public through reports, web page, faculty publications	Data and analysis as input to public planning processes for decision makers and public
Advocate/facilitate enhanced role for public and build their capacity	Engage public in two-way information transfer by convening forums interactive workshops for public with university community and stakeholders	Bring public together to form improved knowledge base for planning
Convene dialogue among stakeholders engaged in planning process	Hold forums for decision makers and stakeholders in dialogue regarding public process; shape decision-making/planning process through partnership with public entity	Decision makers and stakeholders learn of each other's mandates and plans and work together
Archive record of public planning process and generation of shared knowledge base	Record all interactive session in written documentation; make audio and visual recordings of all presentations; make these available to the public via web pages and other mechanisms (CDs, reports, etc.)	Create a public memory of dialogue and information that can be accessed by those who could not attend events and for future researchers and citizens

Waterfront development and planning in Cleveland

Cleveland is located on the southern shore of Lake Erie, the shallowest of the Laurentian Great Lakes system on the North American continent. The Great Lakes constitute the largest single body of freshwater on the planet (fig. 1), covering over 325,000 sq.km. Their basin is home to over 33 million people in the United States and Canada (HEATHCOTE, 2002). Over the past 95 years, numerous bi-national agreements and organizations have been developed to govern water quality and ecosystem management in the Great Lakes basin. These now guide two countries, eight states and two provinces in their efforts to regulate water withdrawals, investigate ecosystem conditions, and collaborate on improvement to water quality and ecosystem integrity. Decisions affecting land use in both the United States and Canada are vested at the local government level (KELLOGG, 1993).

Cleveland was founded in 1796 at the confluence of the Cuyahoga River and Lake Erie. Both the lakefront and river valley were developed for commercial and later industrial enterprise. During the mid- and late 19th century, railroad and port facilities dotted the shoreline, as Cleveland's steel, chemical and other heavy industries came to dominate (KEATING, KRUMHOLZ and WIELAND, 2002; ROSE, 1950). For example, John D. Rockefeller founded his oil refining company, Standard Oil, on the banks of the Cuyahoga River in the late 19th century. The city's garbage was used as fill to extend the shoreline into Lake Erie, and upon this garbage was built the first lakefront road. From the late 19th through the early 20th centuries, the combination of railroad lines, city garbage dump and lakefront roads cut off the city's neighborhoods from the lake and destroyed natural areas (KELLOGG, 2002; ORTH, 1910). Significantly, the lakefront area was also an early location for several large public parks, the land for which had been donated to the City by prominent Cleveland industrialists (KEATING, KRUMHOLZ and WIELAND, 2002; KELLOGG, 2002).

Planning for Cleveland's waterfront has been, for the most part, piecemeal, narrowly focused, un-coordinated across jurisdictions, and driven by real estate and commercial interests in the city.

- The first land use plan for Cleveland's lakefront was sponsored by prominent business leaders as part of the "Group Plan" for civic buildings in Cleveland's downtown in 1903, designed by Daniel Burnham, a nationally prominent architect and planner.
- By 1927, the plan was revised to include plans for a municipal stadium, landscaped terraces, recreation and commercial piers, and a lakefront airport (the stadium, piers and airport were built later) (KEATING, KRUMHOLZ and WIELAND, 2002).

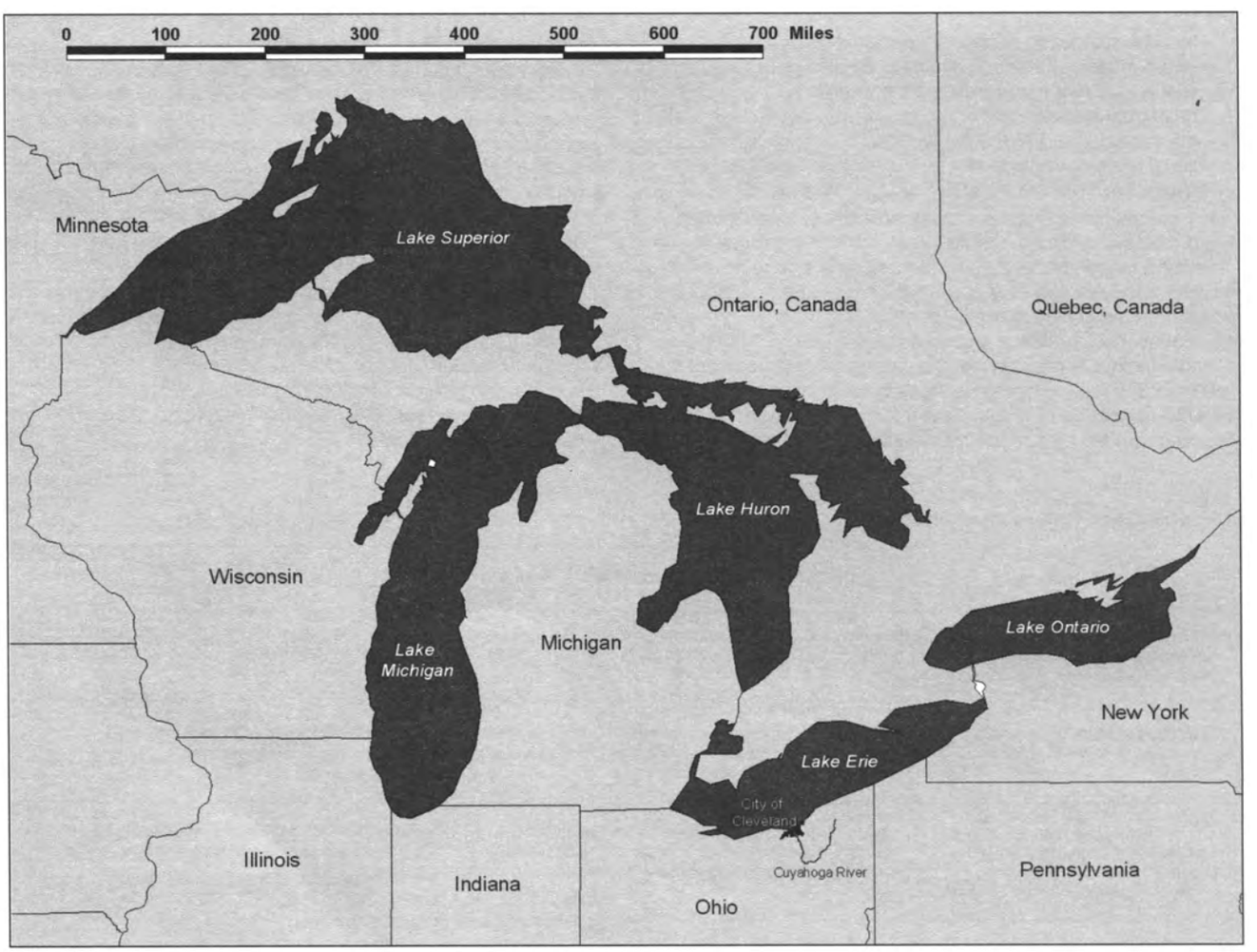

Fig. 1: The Great Lakes Region and the Cuyahoga River, Ohio.

- In 1937, the Regional Association of Cleveland, an organization that defined itself as a "a citizens non-profit organization concerned with the comprehensive physical planning of the Cleveland Region and the better housing of its people," prepared a report on the *Lakefront of the Cleveland Region*. In the report, Ernest J. Bohn, one of Cleveland's greatest visionaries and director of the Association, noted the lack of coordination that was endemic to the lakefront area:

  > There are at least 25 distinct proposals for these 18 miles of lakefront. The outstanding feature of all these plans is their lack of relation to each other, or to any comprehensive conception of the development of the Cleveland Region (BOHN, 1937).

- The City of Cleveland released its own lakefront plan in 1941, which emphasized construction of a "Cleveland Shoreway" and creation of a lakefront airport.
- By 1949, the City of Cleveland published its first comprehensive "general" plan, which also acknowledged the mixed nature of land uses along the lakefront, accommodating parkland, public and private marinas, public properties and the railroads, and a new lakefront expressway.
- Today, land use along the 29 km (18 miles) of greater Cleveland's shoreline is still dominated by traffic arteries, industrial facilities, and other private land uses. Pedestrian and local access, lakefront parks and recreation and public land uses are secondary (CUYAHOGA COUNTY PLANNING COMMISSION, 2002). As the city struggles with the legacy of development decisions made over the past 100 years, new plans and projects are in motion that will shape land use and the quality of life of the city's residents well into the future. An analysis completed in 2001 identified more than 20 local, regional, state, federal, nonprofit, and private plans in varying stages that would affect greater Cleveland's waterways and open spaces. An estimated US$2.1 billion in public dollars would be spent if all were implemented, along with millions of dollars in leveraged private investment (HEXTER, 2002).

Public reaction to the proposals was mixed, asking, "Who is proposing what and why?" The local newspaper's architecture critic characterized the lakefront as the catalyst for the city to "wake itself from the highly limited vision ... to dream big dreams ... to inaugurate a true community planning process for downtown, the lakefront, [and] the river" (LITT, 2001). In a city with a newly elected mayor about to take office, there was optimism that a lakefront plan could be developed and implemented. The big question was whether the city's public planning culture was mature enough to include a broad range of public input. The city always had, by and large, reacted to planning-oriented initiatives offered by the private sector – both for-profit and nonprofit. One outcome of this culture had been the inability of the city to identify and forge a shared vision of how the lakefront should be used.

The situation was ripe for involvement by the college. The mission of the urban university in Ohio[1] is to provide teaching, research, service, and outreach that is mutually reinforcing and is accomplished to bring benefits to the community through transfer of information and capacity-building resources. Since its founding in 1979, the college has been an advocate for and impartial convener of public discussion of issues confronting the city and the region (SWEET, HEXTER and BEACH, 1999). This role was institutionalized in the late 1990s by the creation of the Levin College Forum Program.

College engagement in lakefront planning

In light of the many proposals and plans for the lakefront and the concerns about the lack of public involvement in planning issues, the Forum Program proposed an organized response across the teaching, research, and service missions of the college. The goal was to use the planning knowledge about the lakefront and riverfront among college faculty and staff to facilitate discussion among parties both inside and outside the university (PSOMOPOULOS, 1988; FOOKES, 2004). Our purpose was to foster a dialogue and deepen this knowledge across multiple disciplines, units of social and governance organizations, and territorial scales. As it evolved, the response consisted of four strategies:

- create an advisory committee of members both internal and external to the college to plan the Forum events;
- integrate a series of public programs with graduate planning classes that would focus on the lakefront and riverfront;
- create and deliver this series of Forum events to educate and involve the public well beyond simple dissemination of information;
- build a partnership between the Levin College and the City Planning Commission staff and director, who were the lead designers of the process.

The Advisory Committee

The college convened an advisory committee comprised of several planning faculty, professional staff, and representatives from many of the stakeholders and organizations proposing lakefront plans. These included a local newspaper, another local university, several nonprofit neighborhood development organizations, the State Department of Transportation, the Cleveland City Club (a televised public forum on issues of the day), the Cuyahoga County Planning Commission, and the Cuyahoga Valley National Park, which covers a major part of the Cuyahoga River Valley. These organizations tend to hold very different interests and be on opposite sides of many of the issues confronting the city and region. The advisory committee was key to generating an audience for the Forum Program and a broad base of information.

Planning classes and student education

Several members of the planning faculty agreed to integrate the themes of Cleveland's waterways into courses and to provide incentives for students to participate in the Forum Program events, enhancing the teaching mission of the college. For example, a graduate environmental planning class conducted a study of a naturalizing area on the lakefront that was the subject of considerable controversy regarding its future use as either a public park and habitat area or a paved dock area for the port. Another graduate class developed plans for reuse of a peninsula in the Cuyahoga River directly adjacent to the downtown core. Students from the graduate planning and environmental studies programs also assisted during the Forum events described below, gaining first-hand knowledge about public issues, the role of citizens and stakeholders, and the public decision-making processes shaping the city's future.

The Forum events

In February 2002, the Levin College Forum Program kicked off *Northeast Ohio's Waterways*, a series of public events focused on planning. Figure 2 presents a timeline of the Forum events and their relationship to the city's official public participation process. Several components comprised the Waterways series: the kick-off forum that introduced the "big picture" (including a comparison of the many plans and development proposals), a series of four issue forums on lakefront systems, a best-practices forum, an exhibit on the history of lakefront planning in Cleveland, and a Great Lakes Cities Conference that brought together academic researchers from across the Great Lakes basin.

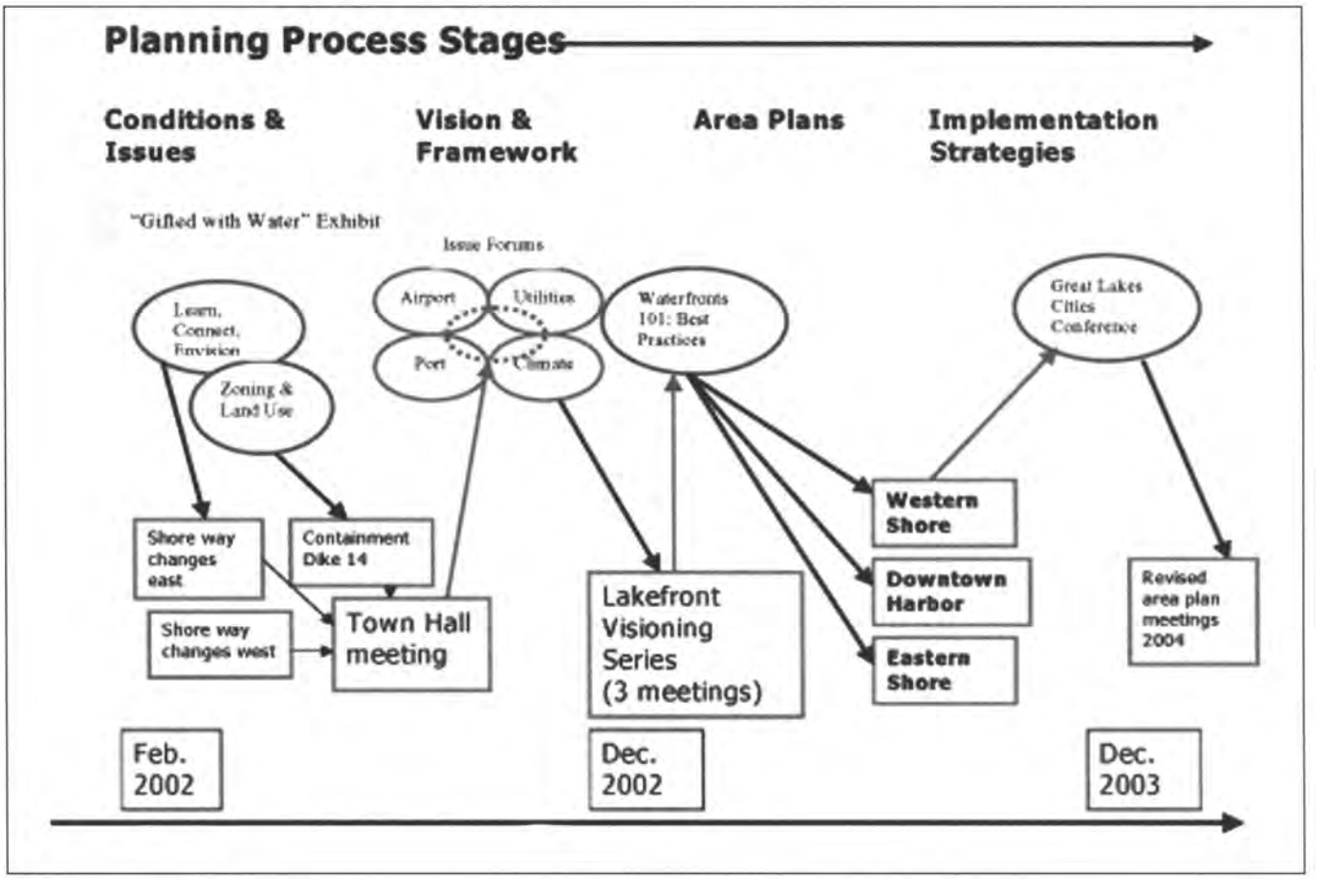

Fig. 2: College Forum and Public Consultation Process.

Elements \ Scale	Locality	Region	Globe
Nature	explore habitat restoration along the highly hardened waterfront edge.	connect the city planning process to improving water quality and ecological health of Lake Erie	connect the Cleveland Lakefront planning process to the Great Lakes region and other urban waterfronts
Anthropos	connect citizens on an individual, emotional level with the lake and river	encourage people to think of lake as a connection to a broader region	
Society	foster an understanding across the community about the need for collaborative, integrative planning and foster recognition of the regional asset constituted by the lake and river		connect the Cleveland Lakefront Plan to similar planning efforts for other urban waterfronts
Shells	identify best practices in housing construction, energy, changing land uses, and other aspects of sustainable development for urban waterfronts		
Networks	identify how the transportation, communication and present day urban structure could be modified to create a waterfront that offered increased public access points, restored habitat		
Synthesis	identify how the many plans that had been developed either support or contradicted one another across multiple aspects of the community (ecological, social, built form)	foster dialogue across stakeholder and decision-maker groups at regional and state scale	communicate Forum events, research and dialogue to greater public in archival format on Forum web page & through academic publishing

Fig. 3: Ekistic Grid for Cleveland Lakefront planning process: Knowledge goals for Forum programs.

The goal of this two-year series was to focus the emerging public discussion about Cleveland's lakefront (fig. 2) and connecting waterways on a vision for the future. We wanted to educate the public about significant planning initiatives (who was proposing what), create connections among the various plans and proposals, build capacity to participate more effectively in the city's public processes, and provide an opportunity for decision makers to explain their mandates, authority, and purposes. Whenever possible, the Forum events were designed not only to elicit opinions about the issues, but also to encourage dialogue-oriented to problem-solving that would provide input to any future planning decisions by the city. Figure 3 presents these broadly defined educational goals of the Forum events.

Over the many Forum events, opportunities were provided for interaction among stakeholders and citizens who would not interact under routine circumstances. Our underlying premise was that if this interaction occurred earlier in the public process rather than later, as was so often the case in Cleveland, public values could be identified early on, conflicts could be addressed, a minimum level of trust would be created, and the result would be, simply, a better plan. During the course of the Forum Waterways Series, more than 1,700 people attended eight events. Sessions focused on land use, transportation, ecological issues, utilities, the regional impact of the city, the nexus of the lakefront and the river, and the opportunities and constraints to remaking the waterfront. These events were attended by representatives from environmental regulatory agencies, planning agencies, the private development sector, nonprofit organizations, faith-based organizations, students, citizens, and elected officials from across the region. Citizens had an opportunity to hear decision makers and stakeholder organizations, and decision makers and stakeholders heard from each other – some for the first time.

After the first event, the positive response from the community gave the university the credibility to have a seat at the table as the City began its own lakefront planning process, enabling us to secure additional community partners and begin to shape the dialogue about the lakefront and the river, all of which extended the role of the university from knowledge generation and dissemination to being a more active partner in framing the planning issues and the process. The university, through the Forum Program, joined other voices calling for an authentic city-sponsored public involvement in the lakefront planning process. At the first Waterways Forum, the newly-elected mayor announced that the City would begin a lakefront planning process and an update of its citywide plan, both of which would involve the public.

One month after the first Forum event, two local foundations agreed to fund development of a lakefront master plan by the City of Cleveland. Funds were to be used to pay for staff, consultants, public meetings, economic analysis, and engineering studies. The foundations requested that a new partnership be formed called the Lakefront Partners to oversee the lakefront plan. The partners consisted of the City of Cleveland, Cleveland Tomorrow (leaders in the business community), the Growth Association (the chamber of commerce), Cleveland Neighborhood Development Corporation (representing community development corporations and neighborhood groups), and Project BLUE (an ad hoc organization representing a coalition of citizen and environmental organizations).

College partnership with the Lakefront Partners

The creation of the Lakefront Partners prompted us to rethink our strategy for implementing the remaining components of the two-year Forum Waterways Series. Although the city was legally responsible for and was leading the planning process, the Lakefront Partners controlled the funding for planning and engineering studies. We had worked hard to engage civic leaders in an ongoing dialogue with the hope that this, in tum, would increase the transparency of public decision making and encourage them to use the knowledge generated at the university and other institutions to inform the planning process. We continued to advocate for a collaborative effort between the city and the university, for a process that would raise the level of public participation towards active involvement in problem solving. However, the city was now not our only partner. An issue that emerged from our discussions with the new partners was the "appropriate" role for the university in the planning process. All agreed that, as an educational institution, we had a role to play in informing the public debate and discussion, but did our role extend further? For example, would the university-based research that was part of our background work for the first Waterways Forum be helpful to the City? Could the university, with the extensive planning expertise of its faculty and professional staff, particularly in the area of public involvement, serve as a consultant to the Lakefront Partners in developing its plan? While city planners were supportive of an expanded consulting role for the university, the idea was rejected by the other Lakefront Partners. They were interested, however, in a continued educational role for the college and agreed to fund a series of four additional public forums on key lakefront land-use issues. The Lakefront Partners also provided funding to archive these Forum events. Archived material includes video recordings of each forum, speaker presentation material and handouts, a detailed written summary of the proceedings, a summary report intended for widespread public distribution, and a CD-rom that includes a complete audio-video archive of the panel presentations, the full report, and the summary document (HEXTER, 2002).

Outcomes of the College role

The College was involved in a full spectrum of civic education activities in relation to planning for Cleveland's waterways. These activities ranged from the more traditional role of creating and disseminating research results to the more complex role of shaping decision making and the planning process through partnership with a public entity. For the university, the Forum Waterways Series and our subsequent work with the city and the other Lakefront Partners prepared us to undertake the more complex role of moving knowledge to action (FRIEDMANN, 1987). We worked in partnership with decision makers to jointly frame the agenda and public involvement process. The process was a classic example of university and community interaction in the urban university model, as described by Ruch and Trani (1995):

> ... [The] university plans and delivers programs and activities that contribute to the improvement of the urban environment in which it resides. Through its many interactions with the community, the metropolitan university seeks to contribute to and ultimately improve the quality of life in the metropolitan area while enhancing its primary mission of knowledge generation and dissemination. Three characteristics identify the particular nature of the interactions between the metropolitan university and its environment: interaction is mutually reinforcing – both the institution and the environment are richer for the participation; interaction is guided by institutional choice and strategy (mission driven); the university values and prizes the interactions, rewarding participants and building such interactions into the ongoing life of the institution (p. 232).

This process included all aspects of our mission: information dissemination (summaries of the sessions were posted on the Forum Program website), enhanced student learning (through classes and attendance at the Forum events), enhanced research and analysis brought to bear on public issues (the anal-

ysis of the plans and their proponents), and collaboration among stakeholders and decision makers (in planning the Forum events). Our students, faculty, and staff gained knowledge about the planning processes and the role of stakeholders through their participation in Forum events and their role in organizing the Forum Waterways Series and subsequent events. The collaboration between faculty and professional research staff is a model for the rest of the university.

The effect of the Forum Program on community knowledge and capacity

The overall effect of the Levin College Forum Program was to educate the community and inform the planning process through broad-based community dialogue. The college programs joined with others in the community to increase citizen awareness of waterfront planning issues, provided opportunities for citizens to articulate their vision of the waterfront, generated interest in the lakefront planning process, and offered opportunities for the public and decision makers to interact through presentations and workshop sessions. Our work enhanced the capacity of citizens to play a more active role in the planning process. The archived Forum events (http://urban.csuohio.edu/forum/waterways/index.htm) expanded the opportunities for citizens who missed the public events to learn about the planning issues and introduced the potential for creation of an electronically-based community dialogue about the city's future (CRANG, 2000).

The University's involvement in lakefront planning activities also helped shape the decision making and planning process through its partnership with the city. The mayor had committed to public involvement in the planning process, but the strategies for involving the public were honed in discussions between the Forum leadership and City Planning Commission staff. The college and the city agreed to incorporate the issue forums into the city's planning process, using college-organized events as transition points to initiate new phases of the city's planning process. This partnership gave the university the "agency" it inherently lacks. Bartelt suggests that creating genuine partnerships with organizations whose first interest is the community itself offers real opportunities for metropolitan universities to address a host of urban issues (BARTELT, 1995, p.15). This was certainly the case in Cleveland.

E-mail survey

In the spring of 2004, the Forum Program conducted a survey of citizens who had previously attended one or more Forum events in the past. The survey was conducted in order to gauge the public's perceptions about the Forum Program as well as its effectiveness in terms of raising awareness and encouraging involvement in civic issues. The survey was administered via electronic mail, using addresses that participants had supplied when attending a Forum event. Participants were sent an e-mail of the survey and asked to respond. Two weeks later the survey was sent again. Of the 1,189 questionnaires sent out, 92 responses were received, a response rate of 8 percent.

Most respondents were from Cuyahoga County, the metropolitan Cleveland area (including 27 residents of the city of Cleveland, 31 from the inner suburbs, and 17 from Cleveland's outer suburbs). One-third of the respondents had attended the initial Forum event, a forum on the future of the lakefront airport, or a forum on best practices for waterfront redevelopment from other cities in the United States and around the world. Most of the respondents had attended between one and three of the eight events, with nearly 20 attending four or more. Table 2 summarizes the survey responses. Of the 92 respondents, nearly 55 percent had subsequently attended between one and five of the city's public meetings about the lakefront.

Nearly half of the participants considered themselves to be very well-informed about civic issues in general and were at the Forum events to become better educated on the lakefront issues. They also saw the Forum events as an opportunity to participate in the planning process.

They overwhelmingly stated their appreciation for the university's efforts to plan and present the lakefront issues to the citizens, with 96 percent agreeing that the educational forums were an appropriate activity for the University. However, only 38 respondents considered the college to be a "neutral" convener, with others concerned that the college was biased toward Cleveland and the inner ring of suburbs since that is where it is located.

A majority of respondents, 79 percent, thought it was "very important" that the city develop a plan for the lakefront. A slight majority of the respondents felt the Forum events changed their perspective on the city and its future, stating that the examples from other cities were valuable, particularly in the *Best Practices* Forum. Respondents said that attending the forums improved their outlook on city government and city planners and that they had learned about planning and lakefront issues. A considerable proportion (26 percent) of the respondents felt their perspective was not changed as a result of attending the forum events. There were concerns that the Forums would not influence the city, and that the city would not "take the risks necessary to try something new."

Stakeholder Interviews

In addition to the e-mail survey, the college also conducted telephone interviews with 14 key stakeholders in the community whose agencies or organizations would likely influence planning and implementation of lakefront redevelopment, including public planning agencies, journalists, private and nonprofit organizations. These individuals had participated in most of the Forum events. Of the 14 people interviewed, 9 had attended at least 5 Forum events.

Interviews were conducted during the spring of 2004 after the Waterways Series had concluded and the city had hosted three rounds of public meetings for its lakefront plan. Interviewees were asked whether they agreed or disagreed with a set of statements on a scale of 1 (strongly disagree) to 10 (strongly agree) with the opportunity to state why or why not or in what way. Table 3 summarizes these responses.

- **The Levin College is a convener of community dialogue:** With an average rating of 8.25, the overwhelming majority of those interviewed agreed that the convening role is an appropriate and important role for the college. Many viewed the college as a neutral, non-threatening place where the community can speak freely, perceiving that the college does not have a political or programmatic agenda and therefore the information it provides is objective and honest. Respondents noted, "Universities are, by their very nature, a safe place for the community to exchange information." They applauded the way the Levin College organized the Forum Waterways Series, noting, "no one else is approaching these issues and no other university (in town) is doing this" and "the atrium (the location where all the forums are held) is the public square of planning discussion. [The Levin College] did a good job and the forums provided great discussion." Another noted of the college that "[T]his is what it should be doing. The forums are invaluable to the city. They provided a common baseline of information so everyone is now able to work off the same set of facts. The college proved it ... can be honest. No one questions the college's objectivity because every other entity has an agenda."

Only one interviewee voiced strong opposition to the college being a convener of community dialogue, stating that "institutions are in charge of community issues but only the elected officials have the power and duty to run those dialogues."

Table 2
Survey questions and responses

Questions and responses	no.	%
Live in Cuyahoga County (metropolitan Cleveland)	74	80
Attended 1-3 Forum events	72	78
Considered themselves "very well" informed on civic issues in general	43	47
Felt educational forums appropriate activity for College	88	96
Thought university a reliable source of information	88	96
Consider college a neutral convener for important community discussions	38	41
Though college Forum programs changed their perspective on city	47	51
Attended 1-5 city meetings on lakefront	55	60
Thought it was "very important" that the city develop plan for lakefront	79	86

Table 3
Stakeholder interviews: Results of Likert Scale[2] questions (1-10)

The Levin College	Mean
is a convener of community dialogue	8.25
is a resource for information on planning and economic isuses	8.38
is a resource for civic education	8.35
should stick to educating students and stay out of civic issues	1.5

• **The Levin College is a resource for information on planning and economic issues:** There was a strong consensus (8.38) among stakeholders that the college is a resource for information on planning and economic issues. Even before the Forum Program was created, the college, its faculty, professional research staff, and students had a track record of conducting high-quality applied research and was looked to as a resource in the community on planning and economic issues. One respondent noted, "[i]t is definitely a resource. It is a major factor in the community of Cleveland." One respondent, however, commented on the lack of consistency or coordination in the research produced by faculty of the college: "The College has a good reputation in the nation and the region. It is a great resource to provide information on planning and economic issues. But, the planning and economic staffs within the College must collaborate on studies to get a balance. For example, a recent lakefront study [by someone at the college] suggests 10,000 people in Greater Cleveland would be willing to purchase housing on the lakefront – more housing on the lakefront would increase the city's tax base and can stimulate the economy. The main question should be, however, how does new housing on the lakefront diminish true public access for everyone to the lakefront?"

This is an interesting comment in that it seems to suggest that the university should have a unified message and that all university-based research should be coordinated. On the contrary, the purpose of the university in society is to preserve the variety of ideas (BOWEN and SCHWARTZ, n.d.). The Forum was created to give voice to the variety of ideas coming from the university as well as from the community and to generate just this type of discussion and debate.

One respondent suggested that the college could do a better job of marketing its resources, especially communicating information on which faculty or professional staff has particular expertise on issues. Another suggestion was that the College create a public memory of this process. (In fact, all information is recorded and archived in various media – print, digital, video, audio).

• **The Levin College is a resource for civic education:** As part of a larger university, the Levin College is viewed as the place where the community goes to be educated (8.35). One respondent mentioned that, because the Forum events address urban issues, the college is teaching the next generation to advance the city. This respondent viewed the college as a place to work between disciplines such as planning and economics. Another respondent raised the issue of neutrality and cautioned that while it is appropriate for the Forum Program to seek to educate, it must always remain neutral and not try to set policy or even recommend it – certain individuals, if called upon, can offer opinions, but the university would be overstepping if it tried to persuade or make decisions regarding specific policy recommendations.

• **The Levin College should stick to educating students and stay out of civic issues:** The majority of stakeholders disagreed with this statement (1.5) and shared the view that "exposing students to civic issues is part of their education." One noted, "[T]he broader community needs to have an opportunity to participate in a dialogue. Who better to (provide this opportunity) than educators? The program is well-run and well-organized." Another added, "the college is not just for tuition-paying students – it is for the community as a whole."

What has been the impact of the Forum?

In an effort to assess the impact of the Forum Waterways Series, respondents were asked a set of open-ended questions regarding their perceptions of the college and the Forum Program. Three themes summarize their comments: opening up possibilities, broadening the base of participation, and valuing planning. These are explored further below.

Opening up possibilities

Nine respondents said that their perceptions about what was possible along the lakefront had changed as a result of the Forum events. As one noted, "detailed information on existing land use and infrastructure allowed the public to better understand the possibilities." Another added that the "factual information provided a common basis for the community to engage

in discussions about issues ... Now ... people have a common understanding from which to work." Others who were more informed about the lakefront from the start felt that the Forum events added some realism to the timeline and funding issues involved with lakefront planning. One noted a shift in tone at the city's meetings toward a more collaborative process since the Forum events were held and was impressed by the "city's willingness to change based on public input."

The majority of interviewees felt the Forums made a significant difference in raising awareness of key civic issues, including environmental issues, and that citizens would be better informed as a result of attending the Forum events. "The Forum was able to attract some new people because it was not the city putting on this program. It provided the community with a framework for what we are dealing with. The forums provided an opportunity for us to dream about all the possibilities." As one respondent commented, "more people became interested who may not have been otherwise. The city got requests for follow-up presentations and that created a web, which involves more and more people."

Broadening the base of participation

It is difficult to separate out the direct effects of the Forum events from the effects of the city's own public meetings, which were held in part at the same time. However, as one respondent noted, the benefit of the Forum events expanded the number of people involved: "There were two processes going on at the same time – the city's public planning process and these forums. The two were complementary and allowed for new people to be brought into the discussion. Those that may not have come to the city's meetings may have come to the forums and vice versa."

Valuing planning

In addition to educating the public about the lakefront planning process specifically, the Forum events were also intended to educate people about the value of planning in general. Greater Cleveland has not traditionally been a community that "valued" planning for the future. The majority of respondents felt the Forum events made a significant difference in terms of educating the community about planning issues. As one respondent noted, "the forums raised awareness of the complexity of planning." Another noted that "the Forum plants seeds and then those who attend can apply what they learn to other issues." Still another added, "There wouldn't be a sense of community (about the lakefront) without the forums."

Summary: Challenges and lessons

As an actor that helps define, articulate, and shape knowledge, the university's role can be critical in urban governance. Local authorities today have to collaborate with an ever-widening set of stakeholders and agencies, including organized business elites (BASSETT, GRIFFITHS and SMITH, 2002). Cleveland's history of waterfront development projects mirrors those in European and other North American cities where a large-scale transformation of the waterfront is proposed and carried out through "public-private" partnerships (LOGAN and MOLOTCH, 1987; SQUIRES, 1991). As we sought to become more actively engaged in this process, the challenge was to carry out the university's mission to educate citizens for democratic participation while at the same time drawing on the university's resources and expertise to inform and bring alternative conceptualizations of the city to the public discourse (HEALY, 2002). We remain convinced that such engagement is a key role for an urban university.

As the process evolved, our participation was not with the city government alone, but with partners who are the key representatives of organized business elites and other stakeholders. This reality was brought to the forefront when the Lakefront Partners, which included the City Planning Commission, were funded to organize the planning process. In this way, the private sector maintains its strong influence on the public planning process in Cleveland.

One challenge in working with the Lakefront Partners related to who would set the agenda for the public participation and information exchange. We were working not with one partner but with four, and there was not agreement among the partners on many fundamental issues, including the role of the university in the planning process. In framing the agenda, the closer we came to the politics of planning, the greater the challenges. At the core of agenda-setting is the power to control information. In any planning process, knowledge is power. While the research and educational roles of the university were not challenged, there were times when the framing of the information communicated to the public and its dissemination was challenged.

The Lakefront Partners reluctantly agreed to provide funding for the four lakefront planning issue forums, acknowledging the college's unique educational role. But the story offers a good example of how the issue of information control played out. There was conceptual agreement on two important items: the topics for the issue forums would be drawn from comments elicited in the breakout sessions of the college's initial waterways forum and the city's lakefront planning public meetings, and the panelists had to possess expertise that was relevant to the themes of the issue forums. However, finalizing the four topics was a challenge as the other Lakefront Partners attempted to exclude issues, such as environmental quality and neighborhood equity, that they perceived as peripheral to their economic development goals. Similarly, once we had agreed on the topics, the politics of the planning effort became dominant. Every detail of each forum was subject to scrutiny, including selecting moderators and rejecting and substituting panelists, often at the last minute. It seemed to be an effort to control the information and message that would be brought to the public.

This provides a good lesson on the politics of planning. We had encouraged the city planners to broaden their scope and to integrate planning for the lakefront with the river and the area near the lake, as the proximity, changing economies, and transportation systems integrate them in function. Yet the mayor needed tangible accomplishments relatively quickly, and there was a sense that expanding the scope to include the river would further complicate what was already a complex planning process. The risk in such partnerships with public entities, particularly those that are somewhat captured by the private sector as we see in Cleveland, is that it might compromise the mission of the university as the steward of the variety of ideas and its obligation to bring this variety of ideas to the public through its outreach programs. The university must safeguard this aspect of its mission, while recognizing that partnerships generate processes that can be structured and facilitated, but the outcome cannot be controlled.

The challenge remaining for the city, the university and others committed to meaningful public involvement in the planning process is twofold.

- On the one hand, the private sector, which was used to controlling planning decisions, had to be convinced of the value of making the process more public.
- On the other hand, citizens, who have seen too many plans emerge fully developed from corporate boardrooms, had to be convinced that they could play a meaningful role in planning and had to be given the tools with which to do this.

It appears that progress was made on both of these fronts. For

the private sector, an early concern was the value of public meetings and the perceived risks of opening the process to public scrutiny and involvement. In the end, however, the Lakefront Partners (the business community representatives) helped sponsor the issue forums and their documentation. Our advocacy of an open planning process that involved the public was based on two rationales: it would result in a better plan (one that would reflect public priorities and values), and it ultimately was the *only* strategy that would lead to implementation.

The main source of tension between the perceived "public" interests and the "private" interests throughout Cleveland's lakefront planning process can be boiled down to one question: For whom are we planning the lakefront, the people who live here or tourists? We suspect that the Lakefront Partners at some point recognized that making Cleveland a better place for the people who live here by redeveloping the lakefront to create more recreational and open space would also make it attractive for tourists, conventions, and other revenue-generating activities. At the same time, the citizenry has embraced the new, more open planning and political culture fostered by the Forum Program and the mayor and the City Planning Commission. The public continues to turn out in record numbers for public forums.

The final lakefront plan was presented to the public in the fall of 2004. It is a comprehensive, long-term plan that connects Cleveland's neighborhoods with its lakefront and was developed with unprecedented public involvement. While not everyone is happy with every part of the plan, based on the high level of public involvement in the process we would expect to see a higher level of public support for and engagement with the implementation of the plan over the next decade than we have seen in the past. In an editorial, the *Plain Dealer* celebrated the high level of public involvement with the planning process, "Anyone whose voice hasn't been heard since Mayor Jane Campbell initiated the conversation in April 2002 hasn't tried to be heard ... And they (the city planning director and staff) listened. As this plan has evolved, the public's impact has been evident." (*The Plain Dealer*, editorial, "Finally, a plan," November 14, 2004).

We will remain engaged in the process to continue to build capacity among the public to be more effective advocates in the lakefront planning process in Cleveland. We fulfill our mission as an urban university in this way through efforts to foster more effective citizenship through participation in public decision-making processes. We will continue to provide opportunities for dialogue, convening stakeholders, decision makers and the public, and slowly but surely broadening the base of people who are knowledgeable about the planning process, who understand the issues, and who are well prepared to take the serious public and private actions that will bring about change.

Notes

1. Enacted by the Ohio General Assembly in 1979, the Ohio Urban University Program mobilizes the research, technical assistance, and outreach resources and expertise of Ohio's eight urban universities to enhance the vitality of Ohio and its metropolitan regions. This 25-year partnership with legislators, cities, and urban universities is unique to the state and nation.
2. The Likert Scale is commonly used in social science research on surveys and questionnaires. It is a rating scale measuring the strength of agreement, often on a five point scale, by the respondent with a clear statement. Thus a total numerical value can be calculated from all the responses. Typical scales include responses of "Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree" or "Very Important, Important, Moderately Important, Of Little Importance, Unimportant, " etc. Many examples of the use of a Likert Scale can be found through a search "likert scale" on www.google.com or other search engines.

References

ARNSTEIN, D. (1969), "A ladder of citizen participation," *Journal of the American Institute of Planners,* vol. 35, no. 4, pp. 216-224.

BARBER, D. (1981), *Citizen Participation in American Communities: Strategies For Success* (Dubuque, IA, Kendall/Hunt).

BARTELT, D. (1995), "The university and community development," *Metropolitan Universities,* vol. 76, pp. 15-28.

BASSETT, K., R. GRIFFITHS and I. SMITH (2002), "Testing governance: Partnerships, planning and conflict in waterfront regeneration," *Urban Studies,* vol. 39, pp. 1757-1775.

BEIERLE, T. and J. CAYFORD (2002), *Democracy in Practice: Public Participation in Environmental Decisions* (Washington, DC, Resources for the Future).

BENEVISTE, G. (1989), *Mastering the Politics of Planning* (San Francisco, Josey-Bass).

BOHN, E. (1937), *Lakefront of the Cleveland Region.* A Report by the Regional Association of Cleveland (Cleveland, OH, Author).

BOYER, E. (1991), "Foreword," in C. Quigley (ed.), *Civitas: A Framework of Civic Education* (Calabasas, CA, Center for Civic Education), pp. xv-xvii.

BOWEN, W. and M. SCHWARTZ (2005. In press.) *The Chief Purpose of Universities: Academic Discourse and the Diversity of Ideas.* (Ceredigion, UK, Edwin Mellen Press).

—— and M. SCHWARTZ (2004). *The University and Its Enemies* (forthcoming), p. 20.

BURNE, E. (1979), *A Participatory Approach to Urban Planning* (New York, Human Sciences Press).

CISNEROS, Henry G. (1995), *The University and the Urban Challenge* (Washington, D.C., U.S. Department of Housing and Urban Development).

CRANG, M. (2000), "Public space, urban space and electronic space: Would the real city please stand up?" *Urban Studies,* vol. 37, pp. 301-317.

CUYAHOGA COUNTY PLANNING COMMISSION (2002), *Lakefront Landuse Map* (Cleveland, OH, Author).

DAY, D. (1997), "Citizen participation in the planning process: An essentially contested concept?" *Journal of Planning Literature,* vol. 11, pp. 421-434.

The Ekistic Index of Periodicals (2004), (Athens, Athens Center of Ekistics). Available at http://www.ekistics.org/. (Accessed September 2004).

ETZIONI-HALEVY, E. (1993), *Bureaucracy and Democracy: A Political Dilemma* (London, Routledge & Kegan Paul).

FISHER, F. (1993), "Citizen participation and the democratization of policy expertise: From theoretical inquiry to practical cases," *Policy Sciences,* vol. 26, pp.165-187.

FOOKES, T. (2004), "The contribution of Ekistics to planning education," Ekistics Education Model Project Paper. (University of Auckland). Available URL: http://www. planning. auckland.ac.nz/Level3/Research-Ekistics.htm (Accessed August 2004).

FRIEDMANN, J. (1987), *Planning in the Public Domain: From Knowledge To Action* (Princeton, Princeton University Press).

HEATHCOTE, I. (2002), "Capacity Development in the Laurentian Great Lakes Basin Ecosystem." Discussion document, Managing Shared Waters/Coastal Zone Canada 2002 Conference, Hamilton, Ontario, Canada.

HEALY, P. (2002), "On creating the 'city' as a collective resource," *Urban Studies,* vol. 39, pp. 1777-1792.

HEXTER, Kathryn Wertheim (2002), *Northeast Ohio's Waterways: Learn, Connect, Envision,* Proceedings of the Levin College Forum, February 9.

HOVEY, B. (2001), "Planning without agency," Paper presented at the ACSP Annual Conference, Cleveland, OH.

KEATING, W., N. KRUMHOLZ and A. WIELAND (2002), "A century of planning of Cleveland's lakefront." Presented November 22, 2002 at the Association of Collegiate Schools of Planning Annual Conference, Baltimore, MD.

KELLOGG, W. (1993), *Ecology and Community in the Great Lakes Basin: The Role of Citizen Advisory Committees in Environmental Planning Processes,* Ithaca, NY, Cornell University (Dissertation).

—— (1998), "Adopting an ecosystem approach: Local variability in Great Lakes remedial action plans," *Society and Natural Resources,* vol. 11, pp. 465-483.

—— (1999), "Toward more transformative service-learning: Experiences from an urban environmental problem-solving class,"

Michigan Journal of Community Service Learning, vol. 6, pp. 63-73.

—— (2002), "Nature's neighborhood: Urban environmental history and neighborhood planning," *Journal of the American Planning Association*, vol. 68, pp. 356-370.

KING, C., K. FELTEY and B. SUSEL (1998), "The question of participation: Toward authentic public participation in public administration," *Public Administration Review*, vol. 58, pp. 317-326.

KWEIT, M. and R. KWEIT (1987), "The politics of policy analysis: The role of citizen participation in analytic decision-making," in J. DeSao and S. Langton (eds.), *Citizen Participation in Public Decision Making* (New York, Greenwood), pp. 19-37.

Levin Forum Program, 2001.

LITT, S. (2001), *Cleveland Plain Dealer* (October 18).

LOGAN J. and H. MOLOTCH (1987), "The city as growth machine," in *Urban Fortunes: The Political Economy of Place* (Berkeley, CA, The University of California Press), pp. 50-98.

MADISON, J. (1865), Letter to W.T. Barry, August 4, 1822, in P. Rendall (ed.), *Letters and other writings of James Madison* (Washington, DC., U.S. Congress/Philadelphia, Lippincott).

MAYBACH, C. (1996), "Investigating urban community needs: Service learning from a social justice perspective," *Education and Urban Society*, vol. 28, pp. 224-236.

MAZEY, M. (1995), "The role of a metropolitan university in facilitating regional cooperation," in D. Johnson & D. Bell (eds.), *Metropolitan Universities: An Emerging Model In American Higher Education* (Denton, TX, University of North Texas Press), pp. 195-205.

ORTH, S. (1910), *A History of Cleveland, Ohio* (Cleveland and Chicago, S.J. Clark).

PATEMAN, C. (1970), *Participation and Democratic Theory* (Cambridge, Cambridge University Press).

PERLMAN, D. (1995), "Diverse communities: Diverse involvements," in D. Johnson and D. Bell (eds.), *Metropolitan Universities: An Emerging Model in American Higher Education* (Denton, TX, University of North Texas Press), pp. 206-217.

PSOMOPOULOS, P. (1988), "The editor's page," *Ekistics*, no. 328, p. 3, quoted in T. Fookes," The Contribution of Ekistics to Planning Education." Working Paper No. 1, Ekistic Educational Models Project.

RICH, R. (1986), "Neighborhood-based participation in the planning process: Promise and reality," in R. Taylor (ed.), *Urban Neighborhoods: Research and Policy* (Westport, CT, Praeger).

ROSE, W. (1950), *Cleveland, The Making of a City* (New York, World Publishing).

RUCH, C. and E. TRANI (1995), "Scope and limitations of community interactions," in D. Johnson and D. Bell (eds.), *Metropolitan Universities: An Emerging Model in American Higher Education* (Denton, TX, University of North Texas Press), pp. 231-243.

SQUIRES, G. (1991), "Partnership and the pursuit of the private city," in M. Gottdiener and C. Pickvance (eds.), *Urban Life in Transition* (Newbury Park, Sage), pp. 123-140.

SWEET, D., K. HEXTER and D. BEACH (eds.) (1999), *The New American City Faces Its Regional Future: A Cleveland Perspective* (Athens, OH, Ohio University Press).

ZIEGLER, J. (1995), "Winds of change: The university in search of itself," in D. Johnson and D. Bell (eds.), *Metropolitan Universities: An Emerging Model in American Higher Education* (Denton, TX, University of North Texas Press), pp. 218-230.

Through the (not so) Green Door: University campus greening and curriculum change

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The text that follows is a revised and edited version of a paper presented by the authors at the Natural City conference – "Success Stories" – organized by the Centre for Environment, University of Toronto from 31 May to 2 June, 2006.

Narrative

Wow! They actually want my opinion! What will I say? Am I qualified to redesign a building to be an exemplar of sustainability? Almost four years of studying architecture and practising being an environmentalist should do it. Yeah, I'll put a green roof on the north facing roof, solar PV shingled roof on the south side, that new vibration-less wind turbine that can go on buildings ... yeah energy self-sufficient and water too ... a grey water system feeding into a contemplative garden, waterless urinals, composting toilets, only local building materials, sustainably harvested wood, best insulation and triple paned argon gas filled windows, biodegradable paints, reused furniture ... it'll be great ... a building with almost no ecological footprint! Everyone will come to this building and see all the newest ideas at work! They'll learn that you can have a quality building that doesn't degrade the environment of future generations or rely on cheap materials from all over the world. We can show students it is possible to make a difference! Also it'll show the administration that they should do more of this; that sustainability makes sense and it saves money in the end ...

Introduction

"Higher education is the industrialized world's top industry ... [In American universities] ... enrolment exceeded 16,000,000 full- and part-time students supported by over 3,000,000 faculty and staff ... One study out of Georgetown University estimated the annual direct and indirect impacts of the American higher education industry at over US $1.2 trillion ... Colleges and universities are found in virtually every city of any size in every northern country, and many of these individual institutions are economic powerhouses in their own right ... Thus, while the university is an "industry" in the new knowledge economy, it is more than that because the specialists of most industries in this economy were trained at the university. In the knowledge economy it is literally the mother of all industries!" (M'GONIGLE and STARKE, 2006, pp. 35, 36, 97).

The Earth Summit, hosted in Rio de Janeiro in 1992, was a strong call for action towards sustainability at the highest governmental levels, and the early 1990s marked the writing of five major international declarations calling on universities to embrace the principles of sustainable development (UN, 1997; WRIGHT, 2004). The strong moral point that "given what academics know about the current ecological condition of the planet, there is an obligation for universities to become leaders in the movement to prevent global ecological collapse" (MOORE, 2005), is widely accepted. That more than one thousand university presidents and vice-chancellors have signed such declarations evidences a commitment, at least rhetorical, to sustainable development (WRIGHT, 2004; TILBURY, 2004).

The Global Higher Education Sustainability Partnership[1] is drawing together case-studies and publications from around the world (CALDER, 2006). Some clear trends are emerging from research into universities that have signed various sustainable development (SD) related charters. While a great number of universities have not progressed past the rhetorical stage, there are significant numbers who are making clear progress through new environmentally themed activities (SHRIBERG and TALLENT, 2003). There is a great deal of action to make university campuses more sustainable. The guiding principle is for universities to reduce their ecological footprints and be exemplars of best practice. The large annual Greening the Campus Conference in the USA and the annual conference of the Environmental Association for Universities and Colleges in the United Kingdom showcase success stories of energy efficiency, ecological building design, and other physical aspects of campus greening. Such initiatives are especially significant given the quotation by M'Gonigle and Starke (2006) that heads this section of the paper.

Yet despite over a decade of engagement in integrating the principles of SD into the university, research gives a picture of activity only happening in pockets, with no comprehensive action plan, no clear leadership and projects falling short of addressing the deep issues raised by a sustainability commitment (SHRIBERG and TALLENT, 2003). Indeed, of the action taken, most seems focused on campus greening while not engaging with the mode and content of the education offered within universities. Blewitt and Cullingford (2004, p. 1) rightly state that universities are "... no longer in the privileged position of simply observing, criticizing and evaluating what goes on beyond the seminar room or campus ... [because they take part] ... in both the production

of knowledge and wealth and the maintenance of poverty." Universities train the captains of industry; they produce the skilled labor force that pushes forward the growth economy; they have been key to the emergence of globalization – for better and for worse.

The assumption of many SD projects at universities seems to be that the transition to a greener campus, or one with a smaller ecological footprint, will lead, as it were, organically to a shift in the experience of students and staff and in turn to a shift in understandings and attitudes. If a campus is designed with due ecological mindfulness, then good ecological behaviors will presumably be modelled and internalized. However, this assumption has yet to be adequately tested by researchers. It is unclear whether gains in efficiency and reductions in ecological footprints of universities have had any significant impacts on staff and student experiences, and especially whether they are teaching and learning differently as a result. To be fair, curriculum reform within any educational institution is very difficult, particularly when the curriculum change involves a shift in the dominant worldview of science and society from our inherited mechanistic worldview to an emergent holistic or quantum science worldview (SELBY, 1999, forthcoming). It is much more manageable to work on physical, tangible changes in the campus and stay away from the political quagmire of curriculum change within higher education.

M'Gonigle and Starke (2006) persuasively argue that campus greening – and in particular regaining a local sense of place and learning to live within the limits and characteristics of the actual space of and around a university – is and will be a powerful force in reducing the ecological burden of cities, regions and countries. Is it possible to merge their vision with one in which the form and content of higher education also embraces the principles of sustainable development? Are we faced with a choice of either pushing forward solely campus greening or curriculum change or community outreach or social justice? Should universities continue to tackle these zones of engagement in isolation, and from within strict disciplinary boundaries? Or are there ways that these issues can be addressed holistically, as enfolded parts of the whole?

The authors of the present paper strongly believe that these issues can be addressed systemically and/or holistically and have been engaged in the first year of a five-year (2005-2010) project to transform the University of Plymouth.

This article briefly introduces and problematizes the term education for sustainable development (ESD) and explains the way the Centre for Sustainable Futures (CSF) interprets the term. The CSF model of university transformation and our pedagogy of sustainability are then presented. With this backcloth, we return to the question of campus greening and whether the University of Plymouth is, and will be, a green campus. The essential question is then addressed: how do you enfold campus within curriculum and curriculum within campus? In addressing the question, innovative interpretation modalities that are being piloted are presented. While CSF has been in the privileged position of a reasonably large capital budget, this is only for a short duration, and so the article continues by considering how to sustain campus change once funding for the CSF capital projects has been depleted. We also explain how we have planned our campus greening so that ESD may continue long after the funding has dried up. The article concludes by summarizing some future directions for CSF and the University of Plymouth.

What is Education for Sustainable Development (ESD)? The stance of the Centre for Sustainable Futures (CSF)

Sustainable development and its educational outcropping, ESD, are terms often heard within governmental, professional and academic arenas, yet they are terms for which there appears to be low public awareness (DARNTON, 2004). Amongst those engaging with the concepts on a regular basis, there is a preponderant tendency to recite and continue to work from and within the oft-quoted formulation, now 19 years old, of the Brundtland Commission report, *Our Common Future* (WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, 1987). Sustainable development is there defined as "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, 1987, p. 43). Key educational documents within the United Kingdom, including the *Sustainable Development in Higher Education: Strategic Statement and Action Plan* of the Higher Education Funding Council of England (HEFCE, 2005) continue to frame their proposals for ESD within the Brundtland articulation, disregarding critiques that it overly lends itself to corporate appropriation and government growth priorities by implicitly calling for "the conservation of development, not the conservation of nature" (SACHS, 1995, p. 434), and so orienting the field in its mainstream expressions away from conceptions of sustainability directly invoking bioregionalism, decentralization, self-sufficiency, direct participatory democracy and the centrality of nature to human well-being (SELBY, 2006).

So what should ESD be in a university? Should it work within now standard definitions or should it be presented as contested space? Should it work within government frames or allow for the bubbling upwards of grassroots, alternative conceptions? Should it be seen as a new specialization or a trans-disciplinary gathering space?

The Centre for Sustainable Futures (CSF) at the University of Plymouth opened on 1 June 2005 following a successful bid by a group of academics representing several disciplines (architecture, biological science, civil engineering, education, environmental science, geography, and law) to HEFCE for initial capital and five-year recurrent funding for a Centre in Excellence in Teaching and Learning: Education for Sustainable Development (CETL ESD).

The goal of CSF, as laid out in the bid document, is "to transform the University of Plymouth from an institution characterized by significant areas of excellence in Education for Sustainable Development (ESD) to an institution modelling university-wide excellence and, hence, able to make a major contribution to ESD regionally, nationally and internationally" (DYER and SELBY, 2004, p. 1). To that end, a core staff of seven was appointed (Director, Deputy Director, Reader, research team of three, Centre Manager and Administrative Assistant), arrangements were made for the partial buy-out of academics as affiliated Centre Fellows on an annual basis (there are 24 Fellows in 2006/7), and, as touched upon below, partnerships were forged with internationally-regarded bodies promoting sustainability; namely, Schumacher College[2] and Forum for the Future.[3]

In its transformative intent, CSF has chosen to project ESD as a messy, contested space involving a dynamic tension between reformist and transformative conceptions of sustainability, and between philosophical and practical emphases. On the one hand CSF is working within reformist definitions and frameworks embraced by governmental and government-affiliated bodies; for instance, the concept of "sustainability literacy," i.e. developing the skills and knowledge for proactive professional engagement with sustainable development, as advocated by one partner, Forum for the Future (PARKIN et al., 2004). On the other hand, CSF's partnerships with Schumacher College, with its transformative and biocentric sustainability agenda, as well as with grassroots organizations and networks in the South West of England offer fertile space for countercultural, transgressive thinking and change initiatives. The Director of CSF has offered a root and branch critique of dominant conceptions of ESD in a recent publication (SELBY, 2006).

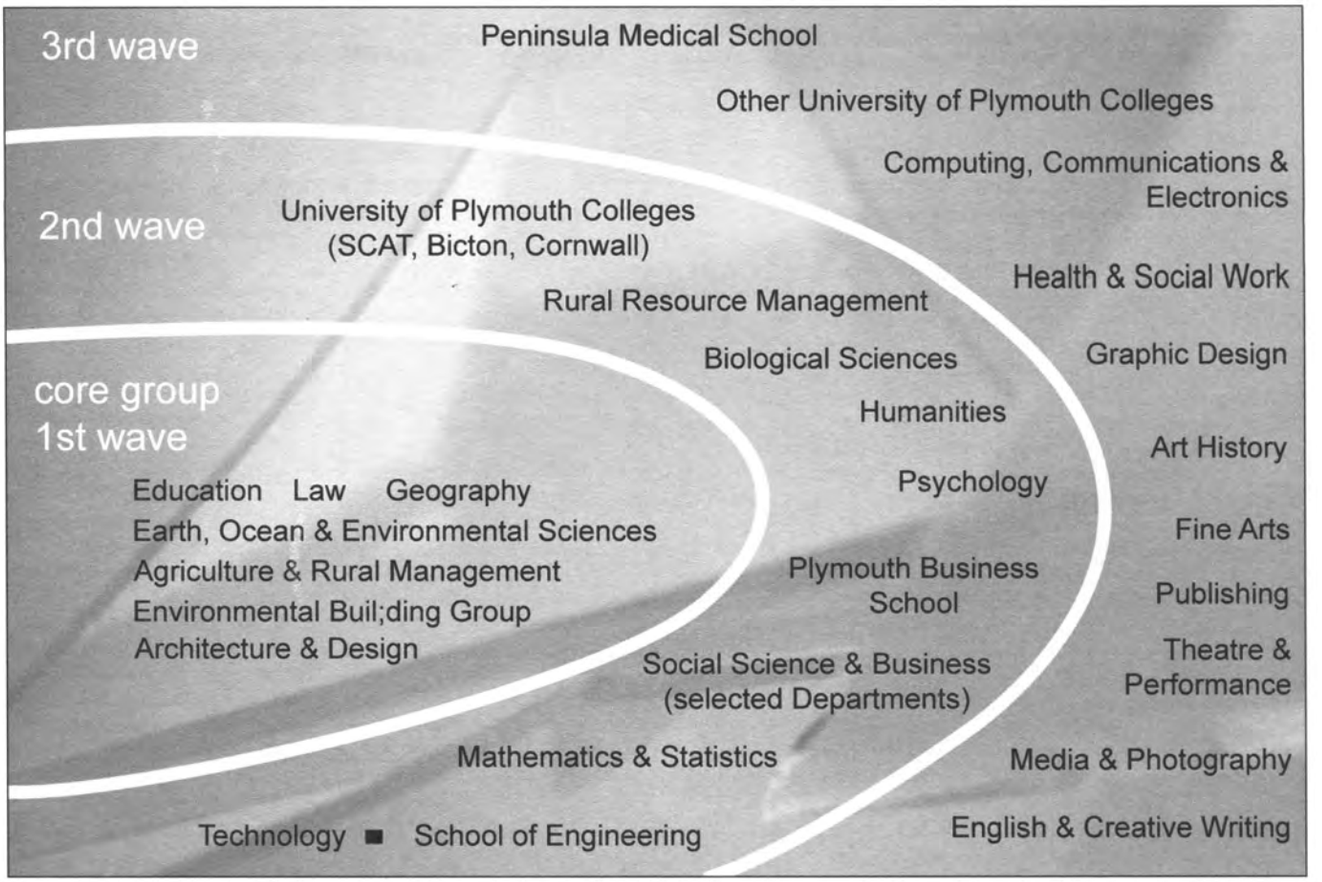


Fig. 1: Initial thinking on how the "ripple effect" might happen, locating other schools and faculties in either a "second" or "third wave" according to their likely amenability to engaging with ESD.

It would seem to chime with academic culture and expectations, and thus be more likely to optimize receptivity amongst the academic community, to convey ESD as contested, even, in broad terms, desirable. Such a stance allows for academics of different disciplines to focus on the philosophical or downright practical, as they see fit. Also, by not closing down the parameters of the area and by constantly questioning the prevailing predominance of environmental and economic dimensions of sustainability, space is always being recreated for consideration of aesthetic, cultural, health and social justice dimensions, thereby opening up the appeal of ESD to schools and faculties that might otherwise not see its immediate connection to their spheres of concern.

In seeking to effect transformation, there are process benefits in vagueness. As Wals and Bawden (2005, p. 38) argue, under a sub-heading, "It is no use crying over vague definitions," vagueness in defining ESD "has enormous canvassing and heuristic capacity if it is systematically used as a starting point or operational device to exchange views and ideas. These ongoing discussions may generate fruitful working hypotheses for the concrete formulation of curricula, study programmes, subject matter content and didactical arrangements."

CSF is conceived of as a gathering place, a strange attractor (CAPRA, 1996, pp. 131-134), where academics of different disciplines come together and explore similarities within differences and differences within similarities around a nebulous but common set of sustainability values as they work on their own or shared, but always connected, initiatives. The potential for transformation, it is felt, is thereby enhanced.

The CSF model of university transformation

In the bidding process with HEFCE, the Plymouth team had to demonstrate already-existing excellence in ESD curriculum and pedagogical development. Those "excellent" faculties and schools from which the team was drawn became the "first wave" areas (fig. 1) with which CSF has worked to "widen and deepen" excellence. The bidding team, in effect, comprised the first (2005/6) group of affiliated Centre Fellows tasked with undertaking curriculum development within both the undergraduate and graduate program provision of their own school or faculty, and drawing colleagues into the initiative through formal and non-formal processes of continuing professional development (CPD). The curriculum development might involve the development of entirely new programs or it might be "infusionist" in nature, i.e. involving the exploitation of thematic windows of opportunity for embedding ESD within existing programs. A key "first wave" aim has been to build levels of collegiality and cooperation within the team on the one hand, and capacities in curriculum development, CPD facilitation, and change agency/advocacy on the other, so that CSF would be both equipped and positioned to engender a "ripple effect" across the institution through core and affiliated staff engaging in university-wide dissemination and change initiatives.

The wave diagram (fig.1) is taken from the bid document and represents initial thinking on how the "ripple effect" might happen, locating other schools and faculties in either a "second" or

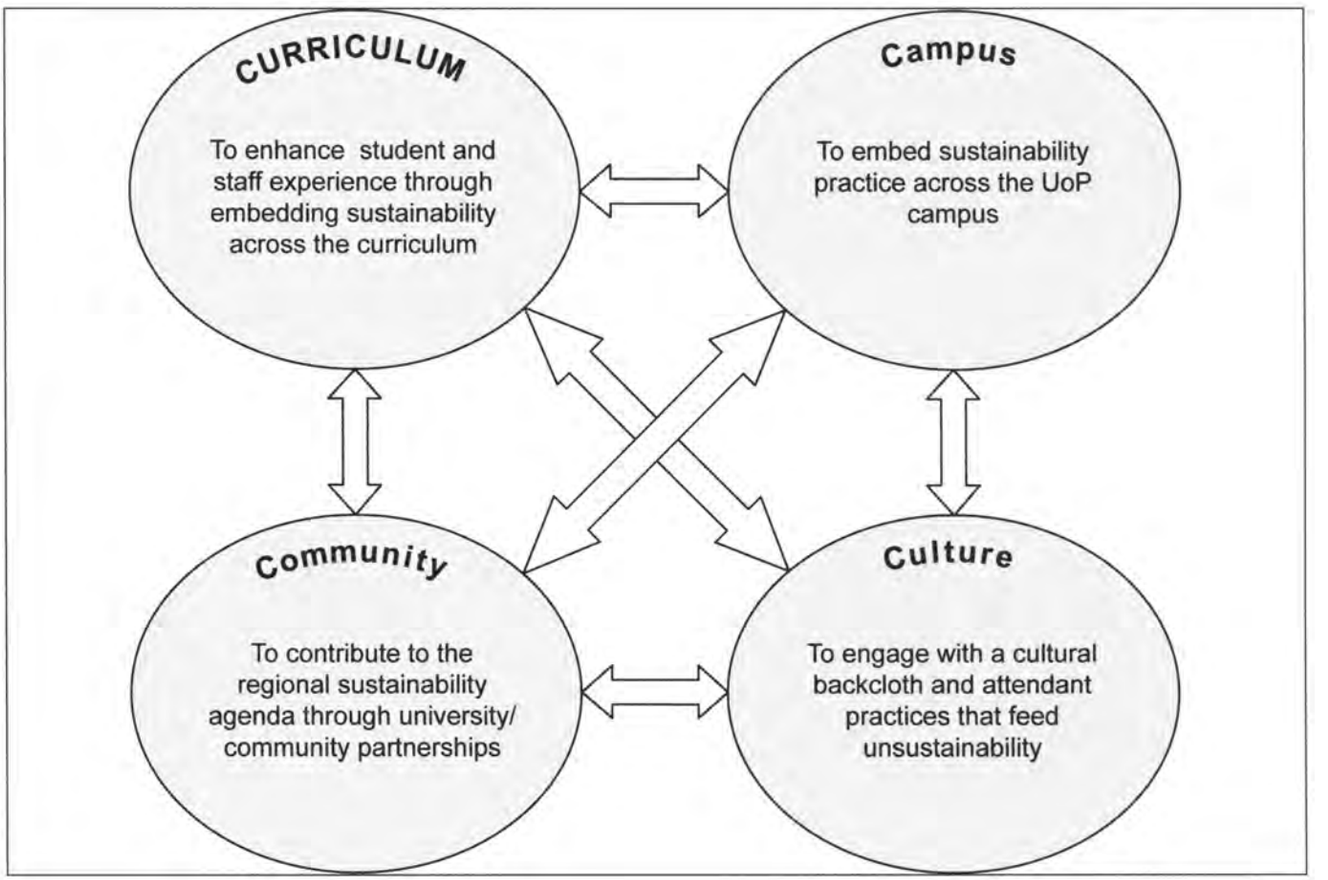


Fig. 2: The Centre for Sustainable Futures is working to a Four "C" model for transformation.

"third wave" according to their likely amenability to engaging with ESD. In retrospect, there was an element of stereotyping in the allocation to waves, in that some schools and faculties that were regarded as less amenable and hence placed in the "third wave," have been found to harbor rich seams of sustainability-oriented learning and teaching practice and have been impatient to join the initiative. Computing, Communications and Electronics, and Graphic Design are cases in point, joining the initiative as pioneer members of the "second wave" for the 2006/7 academic year, and appointing Centre Fellows.

CSF is working to a Four "C" model for transformation (fig. 2). The approach is systemic, and predicated upon an understanding of the radical interconnectedness of processes of curriculum change, campus development and community engagement in embedding sustainability across the university, and the correlative need to recognize, name and work upon the status quo-reinforcing cultural backcloth of assumptions, perspectives and practices that feed and bolster unsustainability.

Woven through the model is the importance of research. The University of Plymouth 2004-2009 Corporate Plan (2004, pp. 4 and 5) identifies research into "economic, social and environmental sustainability" as one of "four strategic priority areas" where "research investment will be strategically concentrated." In line with this priority, CSF has a pedagogical and institutional research team that is researching processes of change under the curriculum, campus, community, and culture headings so that approaches, initiatives and strategies are, with cumulative effect, research-informed.

The nine identified research strands providing a framework for CSF research activities are:

- Starting and evolving perceptions of University academic and support staff;
- Threshold and evolving student attitudes and worldviews (including student narratives of engagement with sustainability);
- The dynamics and trajectory of CSF as a project;
- Curriculum impacts, including student actions projects on campus and in communities;
- Institutional change/transformation;
- Community partnerships and impacts;
- Wider (national and international) partnerships and impacts;
- Pedagogical research; and
- Theoretical research.

A CSF meta-research group meets half-yearly to review all research outputs, explore their change and development implications, and recommend how, in concrete terms, approaches toward the curriculum, campus, community and culture might be accordingly refocused and steered in new directions.

Is there a pedagogy of sustainability?

Sustainability not only encompasses ecological mindfulness and associated competences, but also equity, social justice, health, a peace ethic, and participatory action for change or transformation at multiple levels, personal through global. If we are to establish congruence between "message" (what we learn and teach) and "medium" (how we learn and teach), these principles weight the pedagogy towards:

- A learner-centered (horizontal) dynamic as against a teacher-centered (transmissive or vertical) dynamic, with an accent on

experiential discovery learning;
- A real issues orientation and engagement within the learning process that develops skills, capacities and understandings in real life situations;
- Praxis-oriented learning (a dynamical linking of theory and practice achieved through interweaving hands-on and second-hand or surrogate, media-channelled experience);
- Embracing socio-affective and skills-related objectives as well as cognitive objectives;
- Enabling students to listen to the voice of the countercultural and marginalized (respectively, those opposed to and those harmed by unsustainable modes of living and relating).

The notion of "eco-design" is important in this regard. In *The Hidden Connections* (2003), Fritjof Capra argues that a key dimension in achieving sustainability in any walk of life, including education, is to design human endeavors according to the principles of ecology. Ecoliteracy, that is, understanding and applying "the principles of organization that ecosystems have evolved to sustain the web of life" is "the first step on the road to sustainability" (CAPRA, 2003, p. 203). This suggests that learning and teaching should be informed by processes of partnership, coadaptation, networking, multi-directional energy flows, diversity, a synergistic interplay between an individual's inner and outer self, and a tensile dynamic between the assertive and integrative tendencies in members of a learning community (SELBY, 2000, pp. 90-91).

The implications of a pedagogy of sustainability are that learning should spill out of the classroom and into the campus and community. The interlinking of curriculum, campus and community enables students to become engaged in action learning in multiple arenas, with the classroom housing: initial sharing and framings of theoretical and personal understandings, subsequent dialogue and reflection on actual experiences "in the field," a revisiting of theory in the light of what emerges, and the consequent informing of further action learning plans.

The fourth "C," culture, also has a key place in the learning process. As Rohwedder (2004) has pointed out, there is a "pedagogy of place," a hidden learning agenda from the built and landscaped surroundings of a university that seeps subliminally into the learner. That agenda on most campuses is about reductionism (the separation into disciplines by buildings and floors of buildings), the paucity of architectural cross-disciplinary interface, the application of the metaphor of factory to all university spaces, and a drawbridge paradigm (i.e. lack of shared meeting space with the larger community). An important aspect of a pedagogy of sustainability is an exposing and challenging of the hidden agenda. As Rohwedder (2004, p. 297) puts it: "If the design and operation of our facilities don't fully exemplify the fundamental aspirations of the lessons we are seeking to impart, what then is the message that we convey to our students? If our students and fellow colleagues can't see clearly manifested on our campuses the principles of sustainability that we hope to see boldly adopted by all of society, then how can we ever expect our students to carry this vision forward?"

Fig. 3: Almost half of the largest green space on campus.

Narrative

Wait, why is our lecturer stopping here? You mean this ugly building? The old derelict one that will be in the shadow of the soon to be built four-to-seven story Faculty of Education building? But the roof doesn't face south ... but there will be almost no wind ... wait we can't go in? The first floor may collapse? It needs the ground floor to be dug up and replaced? Additional steel support beams to keep the first floor from falling through?

How are we supposed to show that another world is possible if most of the budget for the building has to go into structural work? I'm confused. What sustainability features will we be able to show to visitors? I thought this would be like the new building at the Eden Project.[4] Where is the "wow" factor?

Hold on. Why am I stuck on appearances? Is there something deeper going on here? I think the real world just crept into my course. I think I just learnt that most design and construction projects I work on won't be sexy flagships of sustainability. Am I disappointed? Well, no actually, I think I like the challenge of having to be creative and engage with all the "normal" builders and architects out there. And I have a few ideas already looking at this old thing. Maybe just the fact of conserving an old building and therefore not needing new materials is a pretty big deal, and I think the window frames are wide enough that the old single paned glass can be removed and double paned glass with a top U rating can be put into the same wood of the window frames. Almost no waste! Now that front door needs replacing, a perfect spot to put in lots of well insulated glass and show off a local, sustainably-harvested, wood door frame. Ok what else ...?

Is the University of Plymouth a "green" campus?

The University of Plymouth only officially opened in 1992 after a 22-year period as a polytechnic and more than 70 years as a site of post secondary learning. The university has been divided across four campuses, with each one having a different focus dating back to its days as a polytechnic. The current Vice-Chancellor is overseeing a process of centralization with the gradual integration of all schools, staff and students onto the main Plymouth campus. The consolidation of four campuses into one downtown urban campus, as well as a growing student population, has led to the creation of a number of new large buildings with several more on the way.

One result of the urban nature of the campus and its growth through consolidation is a severe lack of green space. Figure 3 shows nearly half of the largest green space on campus, though a major road is located right behind it. While the campus may not win awards for aesthetics or green design, it is at the forefront of energy and water efficiency. There is also a lack of in-

formal meeting space, and a near absence of outdoor contemplative spaces. While the university is centrally located beside the shopping district, local residents do not feel welcome on the campus and will even make a detour to avoid walking through the campus.

The short answer to the question posed in the section heading is "no." While personally committed to ecological sustainability, a member of Estate Planning agrees with the consensus that the University of Plymouth does not have a green campus, that its buildings are not exemplars of sustainability, and that it will not have such buildings in the near future. The University has not won awards or media attention for any buildings that push the envelope of environmental design. Interestingly, the member of Estate Planning states, "I do not think that the awards for most sustainable buildings should go to the grand designs, for the architectural wonders ... because such buildings do not have to engage with the way the construction industry operates. The award should go to a company that makes a change to the way it builds its ordinary projects. For example, a company that decides to put solar PV panels on all its new housing starts." This is the challenge: to engage with the way the construction industry and estate planning divisions operate and integrate sustainability into the regular operations beyond a single special project.

Currently, the University is composed of independent building projects in close proximity that were designed and built by different companies with little or no concern for anything beyond basic functionality, time and cost. Figure 4 is an example of the uninspired architecture and lack of green space.

Figure 5 shows the conceptual overlap of the CSF campus strategy. Greening the campus is only one of the three overlapping ideas. Of equal or greater importance is to improve the transparency of the campus change process with the empowered inclusion of students, and to incorporate meaningful (as opposed to just rhetorical) changes to institutional policies and practices bearing upon campus change. CSF was left holding a few cards to move our strategy forward when we were awarded just under US$5 million for capital projects, which had to be spent in two years.

The underlying principle of all the CSF capital spend projects was to bring ESD, and not just sustainable development, onto the campus. Physically manifesting ESD has clearly meant taking steps towards becoming a greener campus, but only as the outcome of a deep process of engagement around the educational qualities of the buildings and landscape. Instead of asking contractors and architects to build the greenest possible buildings, they have been asked to participate in a process of consultation with staff and students and challenged to design and build things of educational value. Surprisingly, the University had never before asked its building contractors, architects and landscapers to consider the educational value of their work and how it might fit into the wider institutional mandate of providing a high-quality learning experience for students. Previously the University's idea of a successful building was one that was delivered on budget, on time. CSF, because it was holding the funds and had the full support of most senior administration, only approved of projects when we were satisfied that the project would help promote the teaching and learning of sustainable development. Indeed that is the whole point of the CSF project and a reference point to which we keep returning.

While there is not enough space to describe all of the CSF capital projects, we will sketch one example for illustrative purposes. When the whole CSF project was just starting, the new Student Union building was in its final design stage and there was a reasonably sized outdoor area adjacent to it that was going to be left empty and paved over. CSF spoke with the Student Union representatives and it was decided that a range of landscaping options would be drawn up based on agreed upon principles and then the Student Union would be consulted as to which plan was

Fig. 4: An example of the less-than-inspiring architecture and lack of green space.

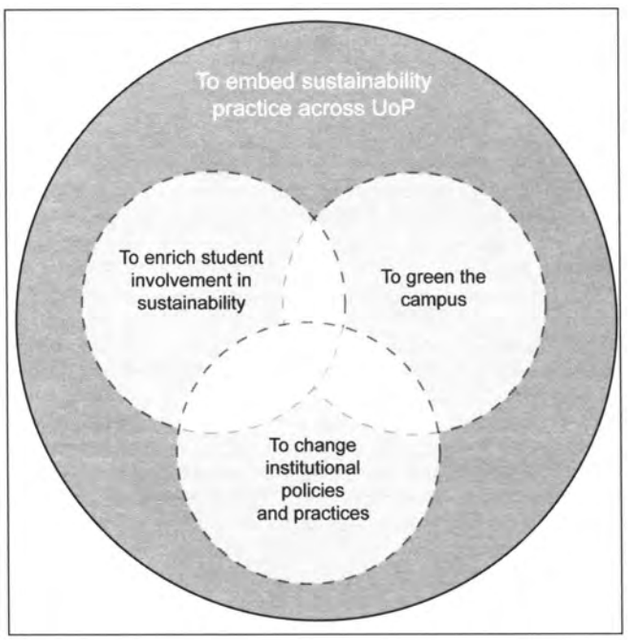


Fig. 5: The conceptual overlap of the CSF campus strategy.

best. To our initial shock, the plan with the least green space was chosen by the students. Upon asking why this was the favored option they stated that most of the time when students are on campus, the ground is wet due to rain; so informal meeting space was a higher priority than dedicated green space. Furthermore the least "green" design included a small stage on the side of one building with a common area in front with slowly terraced steps/levels such that a natural amphitheater was created. This offered a suitable environment for performances and protests that did not previously exist on campus. Therefore, by listening to the students, we were able to address a much needed social dimension of sustainability. The ecological dimension was not neglected however, as several biology lecturers and students took on the responsibility of choosing the species to be planted in the few green spaces with a conscious effort placed on increasing the biodiversity and showcasing resilient species suitable to that environment. The whole design process is being documented

and will be made available through interactive panels in that specific location.

Enfolding campus within curriculum and curriculum within campus

In seeking to make campus and curriculum mutually enfolded dimensions of students' sustainability experience, a range of approaches are being employed.

- **First**, opportunities are being capitalized upon within undergraduate and graduate programs for students to engage collaboratively in taking forward and evaluating campus greening processes. This can occur within modules or, more substantively, by making an aspect of campus the focus of an end-of-program dissertation. Within modules and for their dissertation work, students have already:
  - Contributed to building retrofitting and landscaping projects;
  - Identified and analyzed the energy efficiency of University buildings using the CSF thermal imaging camera (the only such camera not in military hands within the United Kingdom!), making recommendations to University Estates for remedial action;
  - Researched, designed and negotiated the indigenous planting of University green areas;
  - Investigated (as per the narrative woven into this article) environmental standards in the CSF building; recommending, and seeing installed, additional sustainability features;
  - Collected and analyzed data on the sustainability record of different University buildings and, employing innovative information technology modalities, brought their findings to public attention;
  - Participated in co-designing the new Student Union garden, a design process involving architecture and landscaping students in building a covered area for social events and a Sustainability Speakers' Corner, as well as biology students considering appropriate planting and biodiversity aspects; and,
  - Designed and established the CSF website which, unlike the rest of the University, uses free, open-source software allowing for ongoing dialogue around sustainability issues.

As a Senior Lecturer in Architecture put it:

"This is not just a building project; this is about education for sustainability. And the bottom line has always been (about) supporting students and staff in the University ... and understanding better what is going on here, both at the social level and (through) the creation of spaces which are actually positive, socially and culturally as well as environmentally enriching ... but that education basis is fundamental."

Capital monies have been set aside for students from a range of schools – Design, Graphic Design, Media and Photography, Theatre and Performance, and English and Creative Writing – to participate in the co-design and co-development of a proposed one-mile walk through time linking the city center to campus. Beginning on the famed Plymouth Hoe, city residents and visitors, staff and students, will be able to visit, one by one, interactive electronic sites exploring geological and historical time, ending with the exploration of probable and possible futures for humankind and the planet. At several points on the campus, sites will invite students, staff and visitors to enter buildings to view digital displays, presentations, art and artefact exhibits, and films on sustainability-related themes and issues.

- **Second**, efforts are being made to embed campus (and community) engagement in more systematic ways through the writing or rewriting of programs and rules and regulations. Hence, the new Masters in Learning for Sustainability involves students in "immersion experiences" as a core part of the program, in which students engage with "sustainable learning communities" on or off campus, reflecting on their experiences through the lenses of the three modules per term. Other sustainability-related Masters courses are similarly involving sustainability placements with on or off campus communities built into their curriculum requirements. The intention of CSF, as laid down in the bid document, is to be able to provide opportunities for all students, so wishing, to engage in sustainability-related action research by 2010. In support of this goal, consultations are in process with a view to building sustainability criteria into the revision of the University *Learning and Teaching Strategy*, into the student personal development profiling system (a process whereby the skills development of each student is periodically self-evaluated with a tutor) and into course approval procedures. Also significant in this regard is a proposal, current as we write, making it mandatory for students and staff undertaking research with any on-campus or off-campus community to offer evidence that they have engaged the community in discussion of their findings. In this way a feedback loop is created, with less likelihood of research "subjects" left feeling that they are, yet again, the forsaken guinea pigs of the University research imperative.
- **Third**, exciting, innovative and interactive multi-media interpretation modalities are being developed so that future generations of students will be able to explore and learn from the thinking and processes shaping successive campus changes. The modalities will:
  - Describe and explain the building, design, and landscaping decisions made, articulating the opportunities, constraints and alternatives with which those involved were confronted, and the strengths and weaknesses of the final outcome;
  - Feature consultative processes and the processes of engagement of diverse stakeholders, together with their retrospective reflections; and,
  - Provide for the input of, and new interpretative displays by, future waves of students from different disciplines, and encourage re-evaluations of the technical aspects of the building or landscaping development.

According to a member of the CSF campus committee, a key element of the "work that will be shown [is that it] will actually be created by students about the old project, so that, for example, architecture students might actually be asked to look at the history of the particular building that was developed and about its sustainability issues."

Supported by a fairly modest capital spend, staff and students of the Institute of Digital Art and Technology (I-DAT) in the School of Computing, Communications and Electronics, are to take up the challenge of using digital systems (involving hardware and software development) to meet campus sustainability interpretation requirements and student, staff and visitor on-campus formal and informal learning. Projects slated for completion in 2006/7 include:

- **A Waterfall Project:** An animated digital waterfall interpreting water usage on the University's Portland Square Building. In this water feature the width and scale of the waterfall will depend upon how much water the building is using in real-time. If a great deal of water is being drawn from taps, toilets and kitchens the waterfall will grow in volume and represent the powerful draw on resources a community as large as the occupants of Portland Square has upon the water supply. As the demand for water drops, the waterfall shrinks and returns to a pleasant flow. (It should be noted that, at the time of writing, the I-DAT community is debating turning the concept around so that a waterfall trickle symbolizes overuse).
- **Immersion Vision Theatre Roof:** Digitalizing the outside of the half-globe roof of the University Planetarium so that it can convey ever-changing images of and information about global weather patterns, resource use, population trends, global warming and so on, or, alternatively, live data streams on University energy and waste performance, or, indeed, the same images

from around the world that are viewable within the Planetarium.

- **Digital Sustainability Wall:** A wall offering information on latest staff and student research into sustainability-related issues, live presentations, live data streams on the University's sustainability performance, and notice of new initiatives and upcoming events.

Those behind these initiatives recognize that knowledge of sustainability does not necessarily lead to individual or community behavioral modifications, but direct and continuous feedback on the consequences of behaviors in easily digested form can more easily have that effect (SPEED and PHILLIPS, 2006). Such direct and continuous feedback is achievable using the internal and external surfaces of buildings on a campus.

Sustaining campus change and ESD on campus

In a large university with 23,000+ students such as the University of Plymouth, a US$5 million infusion into the capital spend/ infrastructure is very small. It is quite easy to foresee that money being spent and then the university returning to business as usual and forgetting about ESD or even SD in its further campus developments. Therefore, the success of our capital spend will not solely be measured by the reduced ecological footprint of the University, but also by the degree of democratic engagement of diverse stakeholders (including students) in the ever-continuing campus change process. The continuance of that process after the funding runs out is a key indicator of success.

With the goal of sustaining campus change around principles of ESD, CSF has consciously created formal and informal spaces of dialogue for people from different areas of the University. Estates managers rarely interacted with lecturing staff in the School of Architecture, who, in turn, rarely spoke with colleagues in the School of Engineering (with its renowned program in environmental construction), who rarely spoke to the Student Union, while the Environment Committee felt frustrated because its voice was not being heard and action was not being taken on their recommendations. Through the use of its funds for the new capital projects, CSF has reinvigorated the Environment Committee, which is now chaired by a senior representative of Chancellery, and its recommendations are now being acted upon. CSF has also created a Campus Forum with representatives from procurement, estates, schools and faculties, and the student body regularly engaging in eye-opening discussions that are not taking place elsewhere. In essence, CSF has created and helped legitimize spaces for rich dialogue and creative conflict, and opened conduits for innovative ideas to reach the higher levels of the University administration in non-threatening ways. A member of the CSF campus committee recounts such a story:

"During the November discussions that we held at Schumacher, on the day we had the Estates and various other people with us we had short meetings, talking in small break-out groups. One of which included somebody who is responsible for all the teaching space; the sort of person who is the ground support of all the teaching spaces in the university. And there were lecturers and students in the group as well. There was a short discussion at which point he was completely astonished to find that some of the lecturing spaces in the university were actually more successful as teaching spaces than other teaching spaces. And he was really interested to find out why that was; whether it was to do with lighting or the acoustics, or the size of the room. There was discussion about the lecture theatres relating to where you could have different formats for teaching.

And it was really very engaging to find that the Estates people were really keen to make these spaces as good as they could be. And yet that had clearly never been part of their brief in terms of what they were tasked to achieve at the University. And that's rather surprising I suppose, but very odd."

The maintenance of open, yet purposeful, spaces of dialogue between disciplines and across institutional roles is key to sustaining a culture of learning and creativity around campus greening and its connection to ESD.

The continuation of CSF can be viewed in two ways. One is to say that if it is successful it will be funded for the next 25 or more years. Another is to say that it is very successful if at the end of project there is no need for it! This latter notion of CSF weaving processes of ESD into the very fabric of the University such that there is no need for a separate Centre is both very ambitious and very appealing. Ephemerality and sustainability, it has been suggested, are, after all, concepts in dynamic interplay, a dynamical, dancing unity of opposites (SELBY, 2006, pp. 362-363).

Narrative

Well this is a party! Kids playing percussion with old steel drums, plastic bins and broom handles, the deputy Vice-Chancellor whizzing around on a Segway scooter, lots of people and even the sun came out for the opening day. The building still looks a bit grey and uninspiring for a Centre for Sustainable Futures, but I know that the building embodies sustainability. The University even took on my recommendations ... I mean those of my class. They replaced the glass in the windows while keeping the original frames. They used non-toxic biodegradable paints, recycled carpets, they asked the suppliers to use sustainably-harvested wood. There was almost no waste and there's lots of space now devoted to studying and teaching sustainability.

I'm still angry about this door though. How could they? Estates asked for sustainability certificates and they were told "no problem." We asked to see them and were sent a pile of faxes that in the end meant the suppliers were allowed to sell Forest Stewardship Council approved wood. But did they? They wouldn't say. There was a loud silence. So we asked the UK Timber Trade Federation about it and they said that the wood in our door, Koto, is West African and that only one company is certified there. We Googled them, and one of the top hits was Greenpeace with pictures of that company logging illegally in a national park! The best I can guess, the doorway to the sustainable future is lined with the habitat of endangered species from Africa ... This did make people perk up though, we found another company that does follow all the sustainability standards, is competitively priced and can supply the University. It should be University policy soon to only allow FSC wood that has been milled according to ISO 14,000 to be bought here. Maybe another world is possible ...

Future directions

The campus does not have to look green to be sustainable or to promote commitment to sustainable lifestyles among staff and graduates. Equally important in fomenting a sustainability ethic, it has been suggested, are using open and inclusive processes of consultation; working with holistic understandings of sustainability that also give center stage to social justice, health and peace dimensions; embedding sustainability issues in the curriculum and providing students with opportunities for engaging with those issues within real life situations; employing a partici-

patory pedagogy; utilizing campus assets to interpret the campus environment through sustainability lenses; and giving immediate feedback to the campus community on its sustainability performance.

As we write, we look forward to a 2006/7 academic year when, among others, the following initiatives are planned or proposed:

- The development of a graduate culture around sustainability through weekly workshop gatherings of Masters students together with doctoral students on sustainability-related programs, where participants will be challenged by various disciplinary and ideological takes on sustainability;
- Staff/student engagement with University procurement officers to build sustainability criteria into procurement practices;
- Staff/student engagement, especially through the Business School (whose students run an alternative organic restaurant), with University catering services to introduce locally-produced and organic food, with the active support of the Slow Food movement[5];
- The introduction of elements of gift economy into the University, so that, for instance, students might waive part of their fees by contributing time and labor to campus sustainability efforts, or a local non-governmental organization might use campus facilities in return for an in-kind sustainability input.

Narrative

Graduation. What does the future hold for me? Where will I go? I would like to challenge people with the buildings I design, challenge my fellow architects to integrate sustainability into the way they think about design, to show big construction companies that good design with lots of public consultation may cost a bit more, but it delivers much better value and lower maintenance costs.

Wait, what is this big interpretive panel outside the Centre? "Welcome to the (not so) Green Door." What are they doing? Are they crazy to tell everyone that this door isn't sustainable? Oh, I get it. They are using the door itself as a gateway to show people the learning process embedded within the building, within the process of decision-making about renovating it, about how institutional change happens, about how it took a bunch of aware, articulate and persistent people to change the momentum and direction of a university, about how a building does not have to be an exemplar of sustainability to be an exemplar of learning and teaching about sustainability. Maybe even the intangibles of policy change are more significant than the stand-alone success of a sustainable building ...

Notes

1. "Four international organisations with a strong commitment to making sustainability a major focus of higher education have formed a 'Global Higher Education for Sustainability Partnership (GHESP).' The four founding partners of the initiative the International Association of Universities (IAU), the University Leaders for a Sustainable Future (ULSF), COPERNICUS-CAMPUS and UNESCO combine forces in a unique effort to mobilise universities and higher education institutions to support sustainable development in response to Chapter 36 of Agenda 21." Accessed on 21 August, 2006 at http://www.unesco.org/iau/sd/sd_ghesp.html.
2. Schumacher College is located at Dartington, Totnes, Devon. It describes itself as "An international centre educating and inspiring for sustainability." Accessed on 1 August, 2006 at www.schumachercollege.org.uk.
3. Forum for the Future, in its own words, "is recognised as the UK's leading sustainable development charity. Our mission is to accelerate the transition to a sustainable way of life. It is one we share with partners drawn from business, finance, local authorities, regional bodies and higher education." Accessed on 1 August, 2006 at www.forumforthefuture.org.uk.
4. The Eden Project is located in Cornwall, UK, on the site of a former open pit mine. The area was reclaimed and is now a horticulturalist's dream and the region's greatest tourist attraction. The Eden Project just finished building a new education center. In their words "The building is a model of sustainability. The structure is a network of double-curved beams from Forestry Stewardship Council-sourced spruce from Switzerland. The copper for the roof panels comes from a single source – a Rio Tinto-owned mine near Salt Lake City, Utah. The wall tiles are made of Devon clay and are decorated with the handprints of visitors who helped make them." Accessed on 1 August, 2006 at http://www.edenproject.com/about/2172.html.
5. "Slow Food, founded in 1986, is an international organization whose aim is to protect the pleasures of the table from the homogenization of modern fast food and life." Quoted from http://www.slowfood.com/ (accessed on 1 August, 2006).

References

BLEWITT J. and C. CULLINGFORD (eds.) (2004), *The Sustainability Curriculum: The Challenge for Higher Education* (London, Earthscan).

CALDER, W. (2006), Personal communication. Wynn Calder is Associate Director of University Leaders for a Sustainable Future (ULSF, Founding member of GHESP), and serves on the Steering Committee of the U.S. Partnership of the Decade of Education for Sustainable Development (2005-2014).

CAPRA, F. (1996), *The Web of Life* (New York, Anchor/Doubleday).

—— (2003), *The Hidden Connections; A Science of Sustainable Living* (London, Flamingo).

DARNTON, A. (2004), *The Impact of Sustainable Development on Public Behaviour: Report 1 of Desk Research Commissioned by COI on behalf of DEFRA.* Accessed on 15 May, 2005 at www.sustainable0development.gov.uk/publications/pdf/desk-research1.pdf.

DYER, A. and D. SELBY (2004), *Centre for Excellence in Teaching and Learning: Education for Sustainable Development: Stage Two* (University of Plymouth).

M'GONIGLE, M. and J. STARKE (2006), *Planet U: Sustaining the World, Reinventing the University* (Gabriola Island, New Society Publishers).

MOORE, J. (2005), "Barriers and pathways to creating sustainability education programs: policy, rhetoric and reality," *Environmental Education Research*, vol. 11, no. 5, pp. 537-555.

PARKIN, S., A. JOHNSTONE, H. BUCKLAND and E. WHITE (2004), *Learning and Skills for Sustainable Development: Developing a Sustainability Literate Society* (London, Forum for the Future/Higher Education Partnership for Sustainability).

ROHWEDDER, R. (2004), "A pedagogy of place: The Environmental Technology Center at Sonoma State University," in P.B. Corcoran and A.E.J. Wals (eds.), *Higher Education and the Challenge of Sustainability* (Dordecht, Kluwer), pp. 293-304.

SACHS, W. (1995), "Global ecology and the shadow of 'development'," in G. Sessions (ed.), *Deep Ecology for the 21st Century* (Boston, MA, Shambhala), pp. 428-444.

SELBY, D. (1999), "Global education: towards a quantum model of environmental education," *Canadian Journal of Environmental Education*, vol. 4, pp. 125-141.

—— (2000), "A darker shade of green: the importance of ecological thinking in global education and school reform," *Theory into Practice*, vol. 39, no. 2, pp. 88-96.

—— (forthcoming), "Reaching into the holomovement: a Bohmian perspective on social learning for sustainability" in A.E.J. Wals and T. Van der Leij (eds.), *Social Learning Towards a More Sustainable World: Principles, Perspectives, and Praxis* (Tokyo, United Nations Press).

—— (2006), "The firm and shaky ground of education for sustainable development," *Journal of Geography in Higher Education*, vol. 3, no. 2, pp. 351-365.

SHRIBERG, M. and H. TALLENT (2003), *Beyond Principles: Implementing the Talloires Declaration.* Presented at Greening of the Campus V: Connecting to Place, September, Ball State University,

Muncie, Indiana, USA. Available at: http://www.ulsf.org/pdf/ShribergTallentFinal.pdf (accessed on July 31 2006).
SPEED, C. AND M. PHILLIPS (2006), *CSF Buy-in for Development of Interpretation Technologies* (Plymouth, University of Plymouth Institute of Digital Art and Technology).
TILBURY, D. (2004), "Environmental education for sustainability: a force for change in higher education," in P.B. Corcoran and A.E.J. Wals (eds.), *Higher Education and the Challenge of Sustainability* (Dordrecht, Kluwer Academic Publishers), pp. 97-113.
UNESCO (2002), *Education for Sustainability. From Rio to Johannesburg: Lessons Learnt from a Decade of Commitment* (Paris, UNESCO).
UNITED NATIONS (1997), *UN Briefing Papers/The World Conferences: Developing Priorities for the 21st Century.* Information on Earth Summit available at http://www.un.org/geninfo/bp/enviro.html (accessed on 31 July, 2006).
UNITED NATIONS (2002), Press release of the Ubuntu Declaration. Accessed on 31 July, 2006 at http://www.unu.edu/hq/rector_office/press-archives/press2002/pre37.02.html.
UNIVERSITY OF PLYMOUTH (2004), *2004-2009 Corporate Plan* (Plymouth, The University).
WALS, A.E.J. and R. BAWDEN (2005), "Integrating sustainability into agricultural education: dealing with complexity, uncertainty and diverging worldviews," in A.E.J. Wals (ed.), *Curriculum Innovations in Higher Agricultural Education* (The Hague, Reed Business Information), pp. 21-56.
WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (1987), *Our Common Future* (Oxford, Oxford University Press).
WRIGHT, T. (2004), "The evolution of sustainability declarations in higher education," in P.B. Corcoran, and A.E.J. Wals (eds.), *Higher Education and the Challenge of Sustainability* (Dordrecht, Kluwer Academic Publishers), pp. 7-21.

The "Greening the Ivory Towers" Project: The University of Auckland case study

T.W. Fookes, Alison Hall and Logan Whitelaw

Dr Tom Fookes is an Associate Professor in Planning at the University of Auckland, New Zealand. He is a member of the World Society for Ekistics and a graduate of the Athens Center of Ekistics. He arranged an undergraduate Bachelor of Planning student project on Greening University Campuses with the students travelling to Toronto for the Natural City Symposion where they reported on their work with posters and in a formal presentation. The principal student presenters were Alison Hall and Logan Whitelaw in conjunction with Nicola Bishop, Lloyd Johnston, Karen Kao, and Michelle Lee, Bplan students in the Department of Planning, University of Auckland. The text that follows is based on a PowerPoint presentation at the international symposion, 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics.

Introduction

The collaboration between the University of Toronto and the World Society for Ekistics over the Symposion on "The Natural City" (June 2004) has provided an opportunity for students from the Department of Planning at The University of Auckland, New Zealand to extend their interdisciplinary thinking, as introduced through study of *Ekistics*, by contributing to the Symposion. This paper describes that contribution as an example of thinking ekistically.[1]

With the subject of Sustainable Development featured in their courses, it has been appropriate to take some aspect of it as a focus for their contribution. The Canadian-initiated "Greening the Ivory Towers Project" (or GITP), with its emphasis on University campus sustainability, provided this focus. By preparing a case study of The University of Auckland's city campus, the Planning students have been able to apply the Campus Sustainability Assessment Framework (CSAF) as developed for the Sierra Youth Coalition as part of the GITP (see www.syc-cjs.org/gitp/).

The Greening the Ivory Towers Project

The GITP forms part of a larger Sustainable Campuses initiative by the Sierra Youth Coalition and it is intended to operate across Canada at a post-secondary level. Participation by other countries is encouraged. The objectives of the Sustainable Campuses Project are:

- Catalyze and support the development of Sustainability Projects on campuses across the country:
- Use campus sustainability indicators to inform and pressure universities to change their practices.
- Actively promote the inclusion of university faculty, staff and students.
- Support existing groups and actively build groups in their absence.
- Promote the exchange of information, skills, strategies and resources between university environmental groups and from other sources.
- Lobby municipal, provincial and federal governments and those in positions of power on issues that concern the Network in a coordinated fashion.
- Work to make education for sustainability and active learning a part of all formal post-secondary education.
- Provide an annual forum (conference) when students from across the country can gather and share ideas and inspiration in the movement towards campus sustainability. (www.syc-cjs.org/gitp/)

Campus Sustainability Assessment Framework

The Campus Sustainability Assessment Framework (CSAF) is an integrated methodology across the sustainability dimensions of environment, society, economics, culture and health. While it contributes towards understanding environmental and socio-economic impacts, it is intended to go further: to develop "solutions that address overarching structural problems in society and facilitate institutional as well as lifestyle change" (*ibid.*).

The CSAF focused on two sub-systems which are recognized as being "interconnected in the sacred balance of life on this planet" (*ibid.*). The sub-systems are: *Ecosystems* and *People*. Each

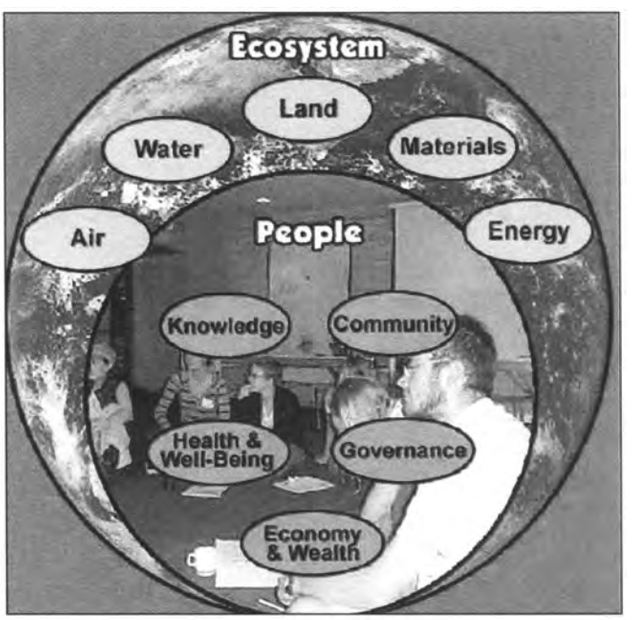
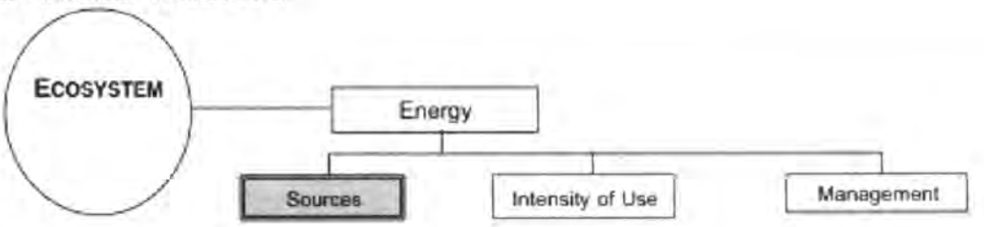


Fig.1: The Sustainability Egg Model for the Greening the Ivory Towers Project (GITP). (*Source:* Sierra Youth Coalition).

sub-system has five dimensions (fig. 1). The many aspects to each dimension are identified as a sub-structure for the model, and indicators are associated with them. Figure 2 illustrates the dimension Energy within Ecosystem. The full list of indicators for the dimension Energy is presented as table 1 together with all the indicators of the two sub-systems (Ecosystem and People) of the model.

ENERGY

This section has 12 indicators.



Sources

Issues: These indicators examine the sources of energy that fuel your educational institution, and how far they must travel before reaching your campus. There are many energy source options available today, and some are much more ecologically and socially responsible than others. These indicators assess these important sustainability issues.

Indicators and Benchmarks:

No.	Indicator	Measurement Units	Short-Term Benchmark	Long-Term Goal
E-1	Renewable Energy: Buildings	Total GJ of energy consumed annually by buildings for heating, ventilation, air conditioning, refrigeration and electrical systems from renewable sources, divided by the total GJ of energy consumed annually for the uses listed in the indicator; multiply by 100. Building energy should include energy used for exterior lighting and signage. "Renewable sources" means clean, non-nuclear, and perpetual renewable energy. Large-scale hydroelectricity is not considered renewable, although small-scale or micro-hydro is.	At least 20%[1]	100%
E-2	Renewable Energy: Fleet and Grounds Vehicles	Total GJ of energy consumed annually for fleet and grounds vehicles and equipment from renewable sources, divided by the total energy consumed annually by those listed uses; multiply by 100. Definition of "renewable sources" is the same as E-1.	At least 20%	100%
E-3	Local Energy Sources	Total GJ of energy (for all uses as E-1 and E-2) consumed annually by the campus produced within 500 kilometres of the campus, divided by the total energy (for same uses) in GJ consumed annually; multiply by 100.	At least 20%	100%

Discussion: The definition of 'renewable' energy is still evolving over time, thus our definition may be altered as new, clean, renewable energy sources come on-line. These indicators may

Fig. 2: Example of one dimension (Energy) with indicators for Sources. (*Source:* Sierra Youth Coalition).

Table 1
The Sustainability Egg Model for GITP – List of indicators by sub-system and dimension

● Sub-system no. 1 – Ecosystem

Water

W-1	Potable Water Consumed
W-2	Storm- and Grey Water Reuse
W-3	Leaking Fixtures
W-4	Water Metering: Potable
W-5	Water Metering: Wastewater
W-6	Pressure Testing for Leaks
W-7	Efficiency of Fixtures
W-8	Motion Detectors Installed
W-9	Wastewater Produced
W-10	Wastewater Treatment
W-11	Stormwater Contaminant Separation/Collection

Materials

M-1	LEED Certified Base Buildings
M-2	LEED Certified Interiors
M-3	Paper Consumption
M-4	Recycled Content of Paper
M-5	Tree-free Paper
M-6	Chlorine-free Paper
M-7	Local Food Production
M-8	Life-cycle Cost Assessment of Equipment
M-9	Solid Waste and Recyclables Produced
M-10	Solid Waste Reduction
M-11	Recyclables Being Landfilled
M-12	Compost
M-13	Hazardous Waste Produced
M-14	Reuse of Hazardous Waste
M-15	Recycling of Hazardous Waste
M-16	Reduction of Hazardous Waste

Air

A-1	Asbestos and Mould
A-2	Scent-free Indoor Spaces
A-3	Opening Windows
A-4	Air Change Effectiveness
A-5	Smoke-free Indoor Spaces
A-6	Living Plants Indoors
A-7	Chemical Free Cleaning
A-8	Pesticides Used Indoors
A-9	Cleaning of Air Handling Units
A-10	Carbon Dioxide Monitoring Indoors
A-11	Indoor Air Quality Complaints
A-12	Smoke-free Outdoor Spaces
A-13	Living Trees Outdoors
A-14	Living Trees Outdoors

Energy

E-1	Renewable Energy: Buildings
E-2	Renewable Energy: Fleet and Grounds Vehicles
E-3	Local Energy Sources
E-4	Greenhouse Gas Emissions: Buildings
E-5	Greenhouse Gas Emissions: Commuting Transport
E-6	Greenhouse Gas Emissions: Fleet & Grounds Vehicles
E-7	Greenhouse Gas Emissions: Campus Travel
E-8	Reduction in Energy Consumption
E-9	Energy Metering
E-10	Energy Efficient Equipment
E-11	HVAC&R System Control
E-12	Automatic Lighting Sensors

Land

L-1	Managed Greenspace
L-2	Inorganic Fertilizers
L-3	Pesticides
L-4	Native Plants
L-5	Healthy Natural Areas
L-6	Restoration of Degraded Areas
L-7	Protection of Natural Areas
L-8	Unresolved Land Claims
L-9	Impermeable Surface Coverage
L-10	Parking Density
L-11	Building Density
L-12	Occupancy Rates: On-Campus Residences
L-13	Occupancy Rates: Classrooms

● Sub-system no. 2 – People

Health and Well-being

HW-1	Recreation Space
HW-2	Recreation Participation
HW-3	Diet Types
HW-4	Nutritional Information
HW-5	Organic, Non-GMO, Fair Trade Food
HW-6	Motor Vehicle Accidents
HW-7	Workplace Incidents
HW-8	Incidents of Assault
HW-9	Physical Health Care Practitioners
HW-10	Sick Days
HW-11	Smoking
HW-12	Mental Health Care Practitioners
HW-13	Retention Rate
HW-14	Spiritual Services
HW-15	Mental Illness
HW-16	Student Suicide Rate
HW-17	Accessible Greenspace
HW-18	Noise Pollution
HW-19	Light Pollution

Community

C-1	Volunteerism
C-2	Financing Volunteer Groups
C-3	Alumni Volunteerism
C-4	Graduates in the Community
C-5	Sense of Community
C-6	Voter Turnout
C-7	Faculty With Disabilities
C-8	Staff With Disabilities
C-9	Students With Disabilities
C-10	Faculty of Ethnic Minorities
C-11	Staff of Ethnic Minorities
C-12	Student of Ethnic Minorities
C-13	Faculty Gender
C-14	Staff Gender
C-15	Student Gender
C-16	Equity of Indigenous Peoples: Faculty
C-17	Equity of Indigenous Peoples: Staff
C-18	Equity of Indigenous Peoples: Students
C-19	Indoor Community Space
C-20	On-campus Housing
C-21	On-campus Housing Affordability
C-22	On-campus Employment Services
C-23	Community Library Cards
C-24	On-campus Media Expenditures
C-25	Affordability of Public Transit

Knowledge

K-1	New Faculty Orientation
K-2	New Staff Orientation
K-3	New Student Orientation
K-4	Faculty Sustainability Training
K-5	Staff Sustainability Training
K-6	On-campus Student Sustainability Jobs
K-9	Research Collaboration - On-campus
K-10	Research Collaboration - Non-profit
K-11	Research Collaboration - For Profit
K-12	Sustainability Research Expenditures
K-13	For-profit Research Contributions
K-14	Faculty Sustainability Research
K-15	Sustainability Pledge
K-16	Sustainability Literacy Survey
K-17	Courses With Applied Learning
K-18	Courses With Sustainability Content
K-19	Students Taking Sustainability Courses
K-20	Faculty Teaching Sustainability Courses
K-21	Quality of Sustainability Courses
K-22	Collaborative Course Development
K-23	For-profit Course Development

Governance

G-1	University Government Policy
G-2	Student Government Policy
G-3	University Government Working Groups
G-4	Diversity of University Government Working Groups
G-5	Reporting of University Government Working Groups
G-6	University Staffing for Sustainability
G-7	University Financing of Sustainability
G-10	Diversity of Student Government Working Groups
G-11	Reporting of Student Government Working Groups
G-12	Student Government Staffing for Sustainability
G-13	Student Government Financing of Sustainability
G-14	Reporting of Student Government Sustainability Staff
G-15	University Government: Implementation Planning
G-16	University Government: Reporting
G-17	University Government: Information Management
G-18	Student Government: Implementation Planning
G-19	Student Government: Reporting
G-20	Student Government: Information Management

Economy and Wealth

EW-1	Students With Loans
EW-2	Student Debt Load
EW-3	Student Fees
EW-4	Number of Financial Awards
EW-5	Value of Financial Awards
EW-6	Allocation of Financial Awards
EW-7	Wage Gap
EW-8	Gender Pay Equity
EW-9	Ethnic Minority/Caucasian Pay Equity
EW-10	Indigenous Peoples/Caucasian Pay Equity
EW-11	Income From Student Fees
EW-12	Income From Government
EW-13	Income from Private Sources
EW-14	Departmental Expenditures per FTE Students
EW-15	Locally Purchased Goods and Services
EW-16	Deferred Maintenance
EW-17	Ethically and Environmentally Sound Investments
EW-18	Local Investments

a b c

Fig. 3: The University of Auckland – The Clock Tower (a), Former house as Faculty Office (b), and Information Commons Building (c).

The University of Auckland case study

Context

The University of Auckland was established as a College of the University of New Zealand in 1882. The University of Auckland became an autonomous institution in 1958. The City Campus is located in the central city area of Auckland. Its current buildings date from 1926 when the Landmark heritage building – "The Clock Tower" – was built. Most of the Central City Campus was built between 1960 and 1970 and some existing houses were incorporated into the site. The most recent building was built in 2003 (figs. 3a, 3b and 3c).

Objectives

The development of The University of Auckland case study was based on the following objectives:

- to participate in the Canadian-driven *Greening the Ivory Towers Project (GITP)*;
- to understand how students could influence practice through their work;
- to apply the GITP *Campus Sustainability Assessment Framework* Approach;
- to establish a baseline for the University of Auckland;
- to develop recommendations for improvements to the University's performance on sustainability indicators.

The students had 12 weeks (a semester) to carry out the case study prior to departing for Toronto. The work formed a special topic which was additional to the main program of study on that semester which meant the students had to work on it in their own time.

Application of the Model

Following the model illustrated in figure 1 (above), the Auckland case study set about applying it to the University of Auckland City Campus. All dimensions in the model (table 1) were actioned with the exception of Air (because that was a city-wide dimension and could be covered later).

● Sub-system no. 1 – *Ecosystem*

Energy

The University of Auckland has addressed major uses of energy within its Environmental Policy. The relevant sections are:

- "The University of Auckland is committed to environmental responsibility in the areas of the natural environment; development, design and management of the built environment; and resource conservation."
- "Undertake the conservation and economic use of utilities such as water, electricity, steam and gas."
- "Encourage the use of environmentally responsible transportation and provide facilities for that use."

These policies can be related to the appropriate parts of the Energy model (fig. 4):

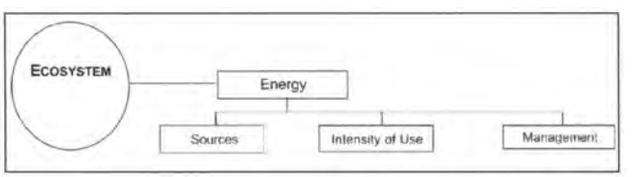


Fig. 4: The Energy model and its aspects.

● **Sources:** Within the University of Auckland City Campus in the year 2002, the energy consumption was 199,350GJ for the day-to-day running of the University. This amounted to an expenditure of over NZ$4 million on energy alone. The main use of this energy is for the heating, ventilation, air-conditioning and refrigeration systems within buildings used by the University. This energy was purchased in three forms: gas, electricity and steam. Gas was taken from 16 suppliers, electricity from 109 sources nationally, and steam from one source, the Auckland Hospital. In 2002, the cost of steam purchased from the hospital was NZ$231,394. This produced 2,185 tonnes of CO_2.

The diesel that is used in Auckland is imported from the Middle East and then refined at Marsden Point near Whangarei before being piped to Auckland and delivered to individual stations. It is consumed by the University of Auckland in a number of vehicles for use by its academic departments, maintenance and for security. These vehicles are generally diesel powered vans or utility vehicles. Diesel vehicles can produce larger emissions if they are not serviced regularly. The distance that each of these vehicles travels per year is dictated by their role in the institution. For example, a van operated by the Geography Department is likely to travel a larger distance each year on field trips than will a maintenance utility vehicle, driving around the campus. Each department has responsibility for its own vehicle fleet.

● **Intensity of energy use:** The University of Auckland has staff and students commuting from all around the Auckland region. As the region consists of large areas of suburban sprawl, many have to travel a considerable distance to access the campus. Many students and staff choose to commute by private vehicle due to convenience and the limitations of the public transport system (bus, rail and harbor ferry) across the metropolitan area. This commuting compounds the congestion problems that Auckland currently faces and also adds the problem of adequate parking provision in the vicinity of the campus.

For students and staff living closer to the campus, the transport system is much better. Students can walk from the student accommodations located near to the university and there is a free bus that travels in a loop around the city center with stops at the University. This bus service uses Hybrid-Electric buses that take their power from a wet cell battery, which is charged by gas turbine running from LPG. This type of engine emits virtually no CO_2 and can travel 320 km per day. Many students use this service to travel around the campus and CBD. The inner loop is supplemented by a wider figure-of-eight loop serving the outer central city area with stops in the Downtown, including the University.

The largest energy user on campus is the Information Technology Systems and Services (ITSS) based on kWh per sq.m. This is no surprise as this department has computers running for most of the working hours along with lighting and air-conditioning. Most of the office space is occupied by computers and each staff member has at least one computer per desk.

Water

Water is a major resource required by the University. This dimension to the model is analyzed under the following divisions: Consumption, Management, Storm and wastewater (fig. 5).

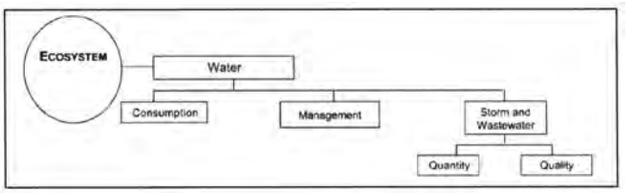


Fig. 5: Water model.

The University of Auckland City Campus has successfully managed to reduce consumption dramatically over the last 30 years (see figure 6), and has in place an Environmental Policy requiring the responsible and appropriate use of water.

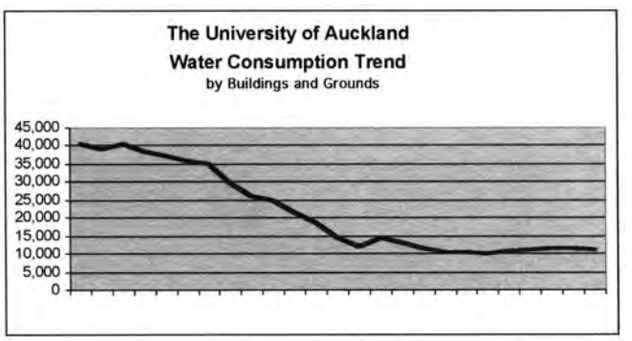


Fig. 6: Water consumption trend. (*Source:* University of Auckland).

Other information relevant to the indicators for Water is as follows:

- During the year 2002, the university consumed 344,235,000 liters of potable water, which equates to 11,663 liters per CCM.
- Neither stormwater nor grey water is collected on the City Campus. However, stormwater is collected on the Tamaki Campus, as per conditions stated in the resource consent.
- The University performs very well in terms of repairing leaking fixtures. Call out times range in terms of severity, from instantly for a burst water main, to half a day, for a leaking tap.
- All of the buildings on campus have at least one water meter installed.
- Motion detectors are installed on the urinals on campus, of which there are approximately 172. The sinks (approx. 400) and toilets (approx. 800) do not have any motion detectors installed.
- The campus produces 213 million liters of wastewater each year, which equates to 7,216 liters per CCM.

Materials

A vital ingredient in campus sustainability consists of the materials that are used and their disposal. This dimension includes materials used in Buildings, Paper, Food, Equipment, and Waste both solid and hazardous (fig. 7). The University of Auckland has addressed some of these elements of these materials within its Environmental Policy.

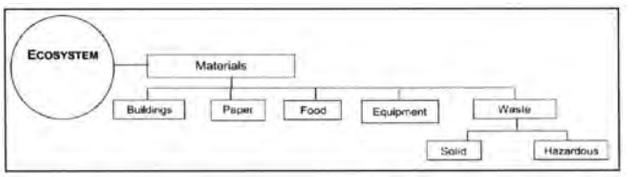


Fig. 7: Materials model.

- *"Educational institutions have a pivotal role in the promotion of environmentally sustainable management.*
- *"The development and operation of the University must allow for a ... healthy environment for members of the University and wider community. This will be achieved through the avoidance ... of any adverse effects of the University's activities upon the natural and built environment."*

The key points for the materials model are summarized below:

● **Buildings:** The University of Auckland currently does not have a green building policy in place and, due to this, we have no buildings that are LEED certified. There is currently no green accreditation program for buildings running in Auckland and, therefore, none of the newer buildings have been certified as energy and water efficient.

It is recommended that the Building Research Association of New Zealand (BRANZ) should bring the LEED accreditation system into New Zealand and the University of Auckland should design its new buildings to the LEED standard. The LEED system would help the University meet its own policy goals through the construction of energy efficient buildings. Through doing this, the University will be complying with its policy: *"Educational institutions have a pivotal role in the promotion of environmentally sustainable management."*

● **Paper:** The purchasing of paper in the University is through a centralized office in the Finance Department. Other departments also purchase paper for their own use and when a special type of paper is required, such as for architecture or fine arts students.

The paper that is generally purchased by the University contains chlorine. The group was unable to find any paper that the University purchased that was tree free. Paper for projects is generally bought off site by students for presentation work and, therefore, this component cannot be accurately measured.

- **Waste:** The University as a whole does not undertake any large scale composting activity. However, in some cases, individual departments have taken their own approach to composting and other solid waste reduction techniques. The Planning Department has a worm farm on one of its rooftop decks which was built by a group of students. Food scraps are placed into the worm farm along with shredded paper, where they are decomposed by the worms. The worms eat through the material and their liquid excrement is collected at the bottom of the worm farm, where there is a tap. The tap then fills bottles of the "worm juice," which is used as organic fertilizer for plants and gardens. The worm farm was constructed from recycled materials such as an old dingy and old water tap and was built by lecturers and students.
- **Hazardous waste:** The University takes the handling and disposal of hazardous material very seriously. There is an appointed person to oversee the operation which is contracted out to a private waste company. Due to this contract, it was hard to gather the information on quantities produced per year. Hazardous wastes include radioactive and genetic material from the medical school and also many forms of chemicals from the Science Department. The University must comply with the following New Zealand legislation in relation to its disposal and handling of hazardous waste:

- The Health, Safety and Employment Act;
- The Resource Management Act (1991) – Part 13; Hazards Control Commission; and,
- The Hazardous Substances and New Organisms Act (1977).

Land

The Land component of the resources "consumed" by the University is a central feature of any sustainability discussion (fig. 8).

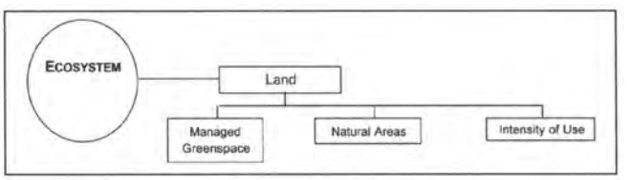


Fig. 8: The Land model.

The University of Auckland was formally opened on 23rd May, 1883 as part of the University of New Zealand, with a disused courthouse and jail housing 95 students and 4 teaching staff. Since this time, the University has been expanding into the surrounding urban environment. Today, the University is an integral part of the Auckland City urban environment and its surrounding grounds contain green space which is used by university students and the general public.

- **Managed green space:** The University of Auckland has few areas of green space remaining, as the pressure to accommodate growth has forced these areas to be used for buildings. The areas that do remain are generally those in the older parts of the University, which are located close to historic buildings. These areas are generally well maintained grass lawns with surrounding gardens. There are few natural areas remaining and most of these are inaccessible, as they are located behind buildings. However, those that do remain contain a variety of native species of plant, but are plagued with weeds and, generally, not maintained in any way.

Albert Park is a large public park that is located across from the University and this area is well used by students and staff. The park contains well-maintained Victorian style gardens and areas of native vegetation, as well as large grass areas. This park mitigates the lack of green space within the campus itself.

- **Natural areas:** As the University of Auckland is a city campus and is located on former army barracks, there are few areas that remain in their natural state. Those that do remain are severely degraded and are only small pockets of land.

Before Europeans arrived in Auckland, the area in which the University of Auckland is located was inhabited by Maori. The tangata whenua (local people of the land), were Ngäti Whätua o Orakei. Today, Maori play an important role in the campus and the University "acknowledges the rights and obligations of the Treaty partners inherent within the Treaty of Waitangi and will endeavour, where appropriate, to meet those rights and obligations through the practice of equal educational and equal employment opportunities." Presently, there are no outstanding land claims on the campus.

- **Intensity of use:** A large majority of the land owned by the University is impermeable. There are no major student parking lots on campus grounds but there are large lots located within walking distance that most students and staff use. The University has 384,921 sq.m of built space on campus, but no student residential rooms. These are located off campus and some have been integrated into existing buildings, such as the Railway Campus, which is a historic railway station within walking distance of the Campus.
- **Internal courtyards:** The traditional Oxford/Cambridge University style of lawn courtyard of the initial University Gothic building has been augmented in new buildings by paved courtyards. These are popular, all-year round (but especially in winter) meeting areas. Most recently, the courtyards are attached to cafés which provide tables outside.

The study to date has concluded that the University should undertake an open space audit to determine the actual amounts of land available for green space use. A plan should then be created to improve the existing green space and protect it from unsuitable development. The University needs to focus on a native planting program, as currently most species within the University are exotic.

● Sub-system no. 2 – *People*

Knowledge

Knowledge is a key component to working towards the goal of finding out:

- how committed Auckland University is to sustainability;
- the ideas and processes that can be implemented to help achieve sustainability within the University, and the Auckland Region.

The Knowledge dimension of the model is divided into the following aspects: Training, Research, and Curriculum (fig. 9).

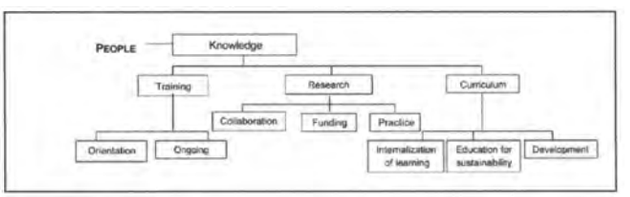


Fig. 9: The Knowledge model.

By examining the 1st level of components of Knowledge in figure 9 the following information can be reported:

- **Training: Orientation and ongoing:** Under the sub-component of "Orientation," the study found:

- the University already meets the long-term goal of 100 percent for faculty and staff orientation;
- while invited to orientation week and able to ask questions of their individual faculty, very few students have had an hour of social and environmental orientation each.

This GITP enquiry means that University staff and orientation organizers have been made aware that there needs to be a greater focus on the environmental policies and actions of the University, and also a greater understanding of Auckland City and surrounding suburbs.

Under the sub-component "Ongoing," the study found that:

- there is insufficient ongoing training for academic staff;
- each faculty is different and while some departments, such as Planning, Geography and Social Sciences will have a focus on training topics that cover sustainability issues, other faculties will not be so involved; and,
- the benchmark requires all staff members to get at least 24 hours of sustainability training per year. If staff are informed, students can be informed on sustainability issues also.

- **Research:**

- There is a large research sector within Auckland University;
- Research can be undertaken and funding can be applied for and is provided by the University and outside sources; and,
- The University of Auckland is host to four of the seven Centres of Research Excellence established by the Government in 2001 to encourage world-class research contributing to New Zealand's development.

- **Curriculum:**

- In 2002 the University offered a total of 3,958 courses.
- Many courses do offer some sustainability content. For example, in 2002, Biological Sciences had 37 percent of their courses with a sustainability component;17 percent of students enrolled in this department took these courses.
- For the Planning degrees most of the core courses address sustainability.
- There is not a sustainability pledge. The University needs to encourage students and faculty to work towards sustainability outcomes.

Community

The *Community* dimension is divided into Involvement and Cohesion, Diversity and Services (fig. 10).

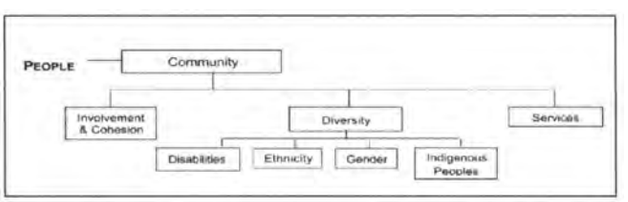


Fig. 10: Community model.

The information assembled under this part of the model includes:

- Equal opportunities for all are promoted; the University works hard to ensure that all people have access to facilities;
- Sports and cultural clubs are an important part of student life; and,
- By ensuring that relationships are strong, sustainable practices can be far-reaching.

Promoting a diverse social and cultural environment forms part of the University of Auckland's Environmental Policy. This policy recognizes and acknowledges that social and cultural values and rights, along with the effective management of the natural and built environment, are essential in achieving a sustainable future.

- **University Community:** The University aims to build strong relationships with the people in its immediate region and beyond. A student who has graduated with either a degree or diploma from the University of Auckland becomes a member of the Alumni Association, as are past staff members. Each year, some 3,000 new graduates are eligible to join the Alumni Association. The University's "friends" are those people who have become involved with the institution, for instance taking part in a careers network and attending public lectures. Currently, there are 100,000 such people who live within the Auckland Region (our local community).The University itself creates a community atmosphere by offering to students a wide range of support and services. Services include libraries within faculties as well as a general library, health services, disability services, childcare services, student commons, recreation center, bookshop, radio station, student magazine and association, Theatre, Gallery and accommodation. The Auckland University Students Association (AUSA) is a student organization committed purely to the students. Membership is voluntary. It looks after the University clubs and sport teams, distributes a magazine each week that contains information about up and coming events and articles from students. A team of 19 elected students run it and elections are held each year in August. The University provides accommodation by means of 3 halls of residences and 6 furnished self-catering residences. Employment opportunities are also offered to students. Part time and full time job opportunities are advertised at student job search (the on-campus employment office) and also for graduates online at www.jobs4grads.net.
- **Equal opportunities:** Giving equal opportunities is something the University of Auckland takes quite seriously and has been committed to for many years. It has made significant advances in the recruitment, retention and progress of staff and students from previously under-represented groups. It was one of the world's first universities to award degrees to women. Its first women professors were appointed during the 1970s when there were numerous social changes occurring. During this period, women enrolment figures increased quite substantially. Today, a significant proportion of students are women and they are not restricted from doing any degree. There are a high number of mature students who also attend, either as undergraduate students or post-grad students.
- **Disabilities:** The University has been constructed so that those who have disabilities can attend. Extra services are provided to these students and staff so that they are not disadvantaged in any way. Services provided include: note takers, sign language interpreters, test writers, lab assistances. Also, within each faculty, there is a disability support person for students and staff. There is a disability center where students with disabilities can go if they need assistance or support. Also within the center, there is a lounge and computer room made available to students when they do not have lectures.
- **Cultural diversity:** The University is culturally diverse. This diversity is recognized by the University, with people's different backgrounds incorporated into university life. The Treaty of Waitangi places particular responsibilities on the University with regard to Maori (New Zealand's indigenous people). There are currently 2,000 enrolled full-time Maori students on campus, along with approximately 50 Maori teaching staff. The University has both its own Marae (a traditional Maori meeting place), and Pacific Island Fava on campus.

Economy and wealth

The Economy and Wealth dimension of the model is approached as "individual" and "institutional" (fig. 11).

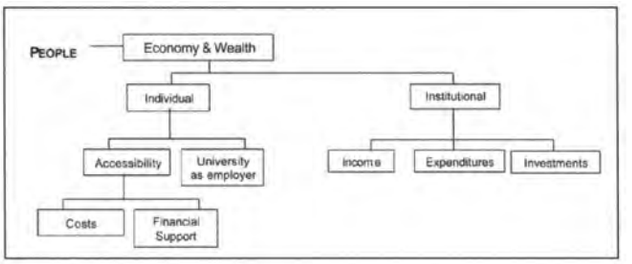


Fig. 11: Economy and Wealth Model.

The study to date focused on the institutional aspect of the model.

● **Institutional – Income:** The University's income derives from three primary sources. Revenue related to student enrolments includes Government subsidies and student tuition fees and is clearly the most significant source, followed by externally funded research and revenue from the provision of other services.

Income from student fees: In 2002, student fees accounted for 25 percent of the university's income and, in 2003, it accounted for 27 percent. The actual figure increased 16 percent in 2003 but the total income of the university was also increased by approximately 10 percent in year 2003. The average university fees showed a 10 percent increase in 2003 from 2002 for domestic students.

Income from government: There is a decrease of 1 percent in terms of percentage of total income from government grants from year 2002 to 2003. However, the total operating revenue the university received showed a 10 percent increase. Therefore, the actual figure of government grant in 2003 was actually increased by 6 percent, compared to the figures of 2002.

Income from private sources: Private sources are comprised of research contracts, service income, donations, interest and other income. This accounted for 36 percent of the university's income in 2002 and 35 percent in 2003.

● **Comparison:** The trend of incomes in terms of its composition at the University of Auckland is relatively consistent in years 2002 and 2003. *Government grants* made up 39 percent and 38 percent of the income; *Student Fees* made up 25 percent and 27 percent; and *private sources* made up 36 percent and 35 percent. The actual amounts from each category were all increased by 6 percent, 16 percent and 9 percent in government grants, student fees, and private sources; and the income of the university was increased by 10 percent. In short, the university received almost 40 percent of its income from government grant, approximately 25 percent from student fees and 35 percent from private sources. These calculations are based on the University's *Annual Report 2003.*

● **Budget 2004:** The budget for 2004 predicts continuing growth in student numbers and research activity, resulting in total income expected to rise again in 2004. Total incomes are expected to rise from the 2003 forecast position by $38.0m to a total of $537.6m, exceeding $500m for the first time. The growth, although healthy, is slowing at only 7.6 percent for 2004, compared with the recent high of 10 percent experienced in the previous year.

Changes in growth parallel the changing growth of student numbers. Student numbers are currently expected to increase by 827 EFTS, many of these amongst the international student population. This growth, combined with increases in fees and funding rates, is expected to produce an additional $25.9m. Over 55 percent of the increase results from the growth and fee rate changes for international students. Research income is increasing by $10m and revenue from other sources by $2.0m. Much of the increased research income is associated with the Centres of Research Excellence operating at the University. Each of these four CoREs is expected to be operating at full capacity for the first time in 2004, with budgets reflecting this increased activity.

Ministry of Education bulk funding has fallen further as a percentage of total revenue to only 35.8 percent, down from 38 percent last year and 41.4 percent in 2000. Combined student fees now amount to 28.9 percent of total revenue, with international fees moving from 3.9 percent to 13.3 percent of total revenue over the 2000 to 2004 period.

Tuition fee income has been rising steadily for a number of years. This rise is traditionally the result of increasing numbers of both domestic and international students, and fees increases for international students. With the change in the Government's funding regime for 2003, the University has been able to realign domestic tuition fees for the first time since 1999.

Governance

This part of the overall model divides *Governance* into a 1st level of Policy, Implementation, and Monitoring (fig. 12). Each of these divisions is considered in terms of University government and Student government.

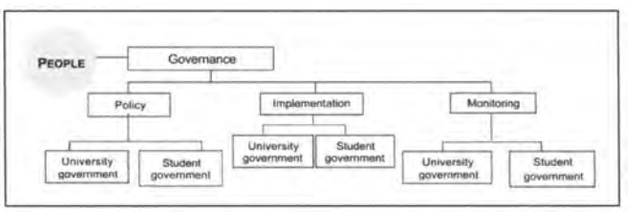


Fig. 12: Governance Model.

The study to date has focused on the area of Student government.

● **Student governance:** The findings to date have included the following:

- The body central to student governance is a voluntary Incorporated Society called the Auckland University Students' Association (Inc.) or AUSA.
- It is a society that is concerned with the problems and needs of students in their widest context.
- This organization is not isolated. There are ties and partnerships between Auckland City and Regional Councils and Central Government.- AUSA works with the principles of the Auckland University Environmental Policy.
- AUSA officers and members try to enforce waste management and recycling initiatives, but do not get much support from students or outside bodies.
- Auckland University works in partnership with Auckland Regional Council.

The body central to student governance is a voluntary, Incorporated Society called the *Auckland University Students' Association (Inc.)* or AUSA. The Association became a voluntary society in 1999 after the Government legislated for a student referendum to remove compulsory unionism on campus. AUSA has been in existence for more than 100 years. The official view of AUSA is that "it is a society that is concerned with the problems and needs of students in their widest context" *(2004 Calendar,* p. 644*)*. AUSA is represented on the University Council and most University committees.

- **Policy:** There are three central documents for the AUSA, which are the Constitution, Administration Policy Book and SRC (Student Representative Committee) Policy Book. There are 266 policies in the Administration Policy Book on 1 January 2004. There are 37 sustainability related policies (i.e. 13.9 percent). Some policies are more detailed in their prescription than others (e.g. the policy on Harassment is three pages long, whereas most other policies only consist of one sentence). Policies in the Administration Policy Book generally aim to encourage consensus building, rather than set specific, strategic goals.
- **Implementation:** There are student representatives who are elected officers of AUSA with portfolios that relate to each of the following sustainability related issues: Education, Environmental Affairs, Welfare, Women's Rights, Maori students, Pacific Island students, and student representative council Chairperson. There is also a President, Administrative Vice President, Treasurer, Tamaki representative, clubs and society representatives, Media officers, Sports officer, Cultural Affairs officer, Overseas students officer, National Affairs officer, International Affairs officer, and the student magazine (Craccum) editor. Each AUSA officer is expected to spend 20 hours per week on their designated responsibilities. This equates to 3.5 FTE dedicated on sustainability related issues.

Responsibility may be more specifically described in the SRC Policy Book, which has major headings including Education, Welfare (health, employment, community development activities, child care, etc.), Women's Rights (trade unions, sexual harassment, education, etc.) and National (issues include accommodation, drug and alcohol, personal rights, etc.), whereas one on environmental policy is underway. Each Student Representative is obligated to report to the committee every fortnight.

- **Environmental Policy:** AUSA is now in the process of developing an Environmental Policy. There has already been consultation with a focus group. It has started with an initiative for a waste audit to persuade the University to implement their Environmental Policy by starting to actively recycle. What recycling occurs on campus is the result of AUSA officer action, such as the paper recycling policy and the "moving away from plastic plates" movement, and is implemented through goodwill.

The Environmental Officer works with other organizations such as the Waste Not, Auckland Regional Council waste minimization program for a waste audit, and AUSA can provide volunteer students if the contractor can provide the equipment. However, this initiative is not totally supported because there is no structured, long-term process in place. There is no recycling facility on the campus, although there is an aluminium can recycle bin in the Quad (the student space), but it is not really in use.

The Environmental Officer is the best person to act on sustainability matters (global and local). It is recognized that being environmentally friendly is also about people's attitude. Educating people does not necessarily change people's behavior. The Environmental officer reports that a lot people know things, but cannot be bothered to do things. The idea of being environmental friendly can be promoted as a "cool thing" that brings up people's incentives to be involved. There has been a lobby to hire permanent Environment sustainability staff and, although it is on the priority list, there is no indication of when it will happen.

Health and Wellbeing

The *Health and Wellbeing* part of the model is divided into five aspects: Recreation, Food, Safety, Health Services, Environment (fig. 13).

There has been a three-fold increase of the population on campus during the past 20 years. The demand on campus facilities and spaces has increased tremendously. This report considers the 1st level of figure 11: Recreation, Food, Safety, Health services and Environment, referring to selected indicators.

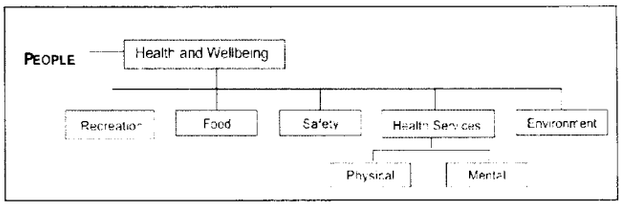


Fig. 13: Health and Wellbeing.

- **Recreation:**

Indicator HW-1: Total sq.m dedicated to recreation uses

The city campus is strained for spaces. The City Campus is adjacent to major council-owned city parks. The domain is 75 hectares and contains parklands, gardens and sports fields. It also houses the War Memorial Museum. Albert Park is just across the road. Large amounts of shopping opportunities within a 5-minute walking distance (400m) may be categorized as recreation activities. Some of the biggest cinemas, theaters and popular pubs are also near the campus, and these activities can be categorized as recreation activities. There are also several dance studios and commercial gym operating outlets. Therefore, it is difficult to judge the circumstances for this campus with this indicator

Indicator HW-2 asks the total number of CCMs participating in recreation programs. The on-campus recreation center is used by 21.7 percent of university staff and students. The demand on the campus gym has increased rapidly during the last 20 years, since the current gym was built. The functions and demands on the gym have also changed. Initially, the gym mainly accommodated squash, badminton and volleyball for local students. The squash facilities remain but the hall is now mainly used for basketball and in-door soccer by groups of Asian and Middle East students. It is also costs money to join the gym, although at an affordable price. Some students choose other alternative means of exercise, as options are rich within the central city. However, the gym on the campus is the second biggest facility in New Zealand in terms of membership. The biggest (privately-owned) gym is only about 1 km from the campus. The University also has another gym branch at the Tamaki Campus (15 minutes' drive from the city campus), which has much more on-campus green space dedicated to sports use.

- **Food:** To find out the percentage of accommodating different diet types (HW-3) is a complicated measure, since there are many other food outlets competing with the one on campus provided by the University. There has also been an increase recently of another seven food outlets. That brings the total number to 14 food outlets on the campus. (Seven are owned by university catering, while the other seven are private leases.) These outlets are mainly cafés. There is one sushi place, Indian food outlet, two Chinese/South-East Asian places and a kebab that sells halal food, as well three other university-owned hostels providing packed, as well as hot, lunches for their residents, not to mention other commercially run student hostels/apartments near the university. For the same reason, it is difficult to provide information on nutrition and availability of certified organic and/or non-genetically modified food.
- **Safety:** The city campus has developed within the street network, requiring students to move across major through routes like Symonds Street and Princes Street. A connecting street to the Grafton Gully motorway system bisects the campus along the Main Library and the Student Union. Underpasses are provided, but students are still injured crossing at street level. There has been a recent death but statistics are not readily available.

The University provides a 24-hour Security Service on Campus with foot patrols. Phones are provided around the campus to enable calls for help. Open spaces are well lit, as are parking areas.

HW-7 Workplace incidents per year

The University is subject to the Occupational Safety and Health legislation and associated Accident Compensation levies for workplace accidents. (HW-7 indicator: 233 /3,537*1000 = 65.9 [accidents and incidents.]) Body stress, falls, trip, slip, and hitting objects have made up 60 percent of the common accidents. Sprain and strain made up over half the injuring results, followed by open wounds and bruising or crushing, with both of them making up just over 10 percent of the accident result. There are fewer incidents. (6/3,537*1000=1.69)

HW-8 Incidents or assault per year

Accident and incident: 284 /29,516*1000 = 9.62

Incident only: 7/ 29,516*1000 = 0.24

This record refers only to reported incidents and accidents (where an incident claim form has been filed. Sometimes, it may take a doctor's approval for the claim).

The findings so far include:

- There has been a three-fold increase of the population on campus during the past 20 years. The demand on campus facilities and spaces has increased tremendously.
- The University has paid close attention to services that contribute to students' health and wellbeing. This has occurred in collaboration with the AUSA who can identify students' needs.
- Safety and security have emerged as a major aspect of campus wellbeing.
- Occupational Health and Safety laws apply to the University. The University has a "no smoking" policy inside all the buildings.
- There are considerable issues surrounding road safety, as the city campus is located in the heart of Auckland City, in amongst some busy roads.
- There are centers of spiritual wellbeing for many different members on campus.

Conclusion

When the specific findings are reviewed across all parts of the model,[2] some general observations have been possible. These include:

- The University has an Environmental Policy but there is further scope for it to be implemented effectively;
- The ECOSYSTEM indicators are more readily recognized as contributing to Campus Sustainability than the PEOPLE indicators;
- A comprehensive set of Campus Sustainability Indicators from the SYC model will take some time to complete;
- The Campus Sustainability Assessment for the University of Auckland is capable of further expansion and adoption by the University Administration as well as most faculties.

In addition it is possible to make some observations about the Campus Sustainability Assessment Framework (CSAF) as an example of thinking ekistically. These observations include:

- The "egg of sustainability" model is an example of defining the scope of a problem, and portraying it, in a comprehensive way. This is the first step consistent with the idea of *thinking ekistically.*
- This approach is continued with the sub-models for each of the dimensions (e.g. *Ecosystem:* Energy) and the identification of Indicators with targets. This aspect of the approach is effectively introducing an example of a *cascade*, where one moves systematically and consistently through a progression of associated or linked ideas and components.

Notes

1. "Thinking ekistically" is a description of a process where one brings together in a systematic and holistic way a number of components for an issue, thinks about the relationships between the components to develop the direction of the enquiry, and then works towards a synthesis as the basis of the conclusions. The components may be derived from the five ekistic elements (NATURE, ANTHROPOS, SOCIETY, SHELLS, NETWORKS).
2. With the exception of LAND which was not included in this round of the study for logistical reasons.

Non-motorized mobility in cities of the future: College and university campuses as a pilot project

Spenser Havlick

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Introduction

The concept of "Cities of the Future" is an everlasting challenge and a somewhat elusive goal of urban planners and citizens who seek healthier, more sustainable human settlements. Ecumenopolis, Arcosanti, the British and European new towns, the City Beautiful Movement, Utopian experiments, floating cities on the sea, orbiting space colonies and the New Urbanism approach have all tried to paint pictures of what settlements of the future could be. Certainly a focus of the early Delos Symposia, Doxiadis Associates, the Athens Center of Ekistics, and the World Society for Ekistics was to bring diverse disciplines together in order to create communities that are healthy, sustainable and equitable for the citizens of all ages and abilities.

Urban scholars remind us that cities of antiquity and the towns and cities that followed were totally dependent on animal and human power for mobility. They include Knossos, Jericho, Athens, Peking, Alexandria, Venice, Florence, Constantinople, Rome, Mexico's Tenochtitlán and Chichén Itzá. With the industrial age and eventually the advent of the automobile, the many thousands of years of total non-motorized mobility came to an end. Trolleys, trams, trains, buses and cars gave pedestrians new forms of mobility. The intrusion of railroad track and roadways into the natural environment were not the greatest impacts; rather trolley tracks, rail lines and expressways opened rural landscape to development which eventually became dependent on the single occupant vehicle. Roads and freeways to the suburbs accelerated sprawl in large U.S. cities like Phoenix, Atlanta, Los Angeles, San Jose, and Detroit. Since World War II, cars have helped transform the human settlement into sprawling congested parking lots, clogged roadways, reduced density and reduced energy efficiencies. They have exacerbated air, water and noise pollution, disenfranchised the majority of the population who do not drive, and placed the world in political turmoil, seeking a dwindling supply of cheap oil.

With the list of negative impacts imposed on urban environments, it should be of little wonder that cities of the future need to become substantially less dependent on the single occupancy vehicle.

The future sustainable city

With this history of many decades of what the automobile and its related infrastructure have done to the cities of North America and much of the post-industrialized world ... with decreasing portal to portal speeds since the 1920s, one should be driven to ask: "What does the future hold for a sustainable city, the natural city in our lifetime or in the years to come?" To help answer the question, I did not want to rely totally on my 21 years as a city council member, or my experience teaching about environmental impacts, or as an urban consultant working on sustainability in several Australian cities. I went to the internet to see what, if any, citations or references about "Cities of the Future" are available. Clicking on Google, I found 18,500,000 sources for "Cities of the Future!" Next, I asked Google about the availability of references on "non-motorized mobility" and got 14,500 possibilities.

After reading several hundred of what seemed like very good engineering and design ideas, I tried to integrate these inputs with some of the social, ecological, and political factors that may open a pathway to future human settlements that *could* become healthier and more sustainable than they are today ... at least from my perspective. Neighborhoods, towns and cities of the future can utilize non-motorized transportation under rather specific conditions:

- The city plan and land use zoning need to encourage density (at least 20 units per acre) and encourage mixed uses. There needs to be a master plan for connecting cycleways and footpaths.
- The community should apply transportation demand management (TDM) strategies to decrease car dependency. These could include vehicle congestion pricing, increased parking, and toll fees.
- Infrastructure for pedestrians and bicycling should reflect the investment percentage which corresponds with the modal split goal: i.e. if a city seeks to have 25 percent of trips in the central city to be non-motorized modes, then 25 percent of the transportation budget should be dedicated for those purposes.
- An ongoing safety and education program is required for a town or city to shift behavior away from auto-dependency and toward increased walking and cycling.

Fig. 1: Typical scene of non-motorized transportation of a college campus. (*Source:* The author).

Fig. 2: Bicycle mobility embodies travel with a smile, good exercise, and clean air. (*Source:* The author).

Fig. 3: Successful new towns and cities of the future will separate vehicular traffic from cyclists and pedestrians. This underpass improves mobility and safety, especially in wintry conditions. (*Source:* The author).

If non-motorized transportation of a college campus can be extended to future cities, those human settlements will be more sustainable, more livable (fig. 1). Notice that 14 bicycles can fit into one car parking space. At an average of US$25,000 per space the cost of providing car parking erodes the budget for research and teaching, or other community needs.

In order to inventory the community's needs and expectations about non-motorized mobility (NMM), here is a sample "opinionnaire" that could be used:

- Is your town or neighborhood optimal for walking and biking? If not, why not?
- Are footpath and bike path lighting and signage adequate? Is year-round maintenance provided for sidewalks and bike paths?
- Are appropriate safety devices in place for pedestrians and cyclists so that people of all abilities feel safe?
- Do separated bike paths and grade-separated routes (from car traffic) exist in practice and on maps?
- Are bike shops active promoters of non-motorized mobility?
- Do schools, retail areas and recreation facilities have covered or secure parking for cyclists plus good incentive programs such as Bike to Work and Bike to School Days each month?
- Is adequate enforcement of safety rules, helmet use, etc. in place? Have bicycle-mounted police been provided?
- Is there a master plan for NMM, and a bike-ped coordinator to facilitate the plan and to promote marketing of NMM to tourists and visitors?

At this point, one may think that I am about to launch into a discussion of how NMM can be implemented in the space colonies circling in L_4 or L_5 orbits, or the E-cities in Dubai and Capetown or the fantasized underground cities of tomorrow where sub-urban renewal engineers are telling us there are 100 quadrillion cubic feet of real estate under our present North American Cities. They tell us that there are 850,000 square meters under Beijing being developed with schools, hotels and restaurants.

But that is not where I want to take this discussion. Instead, my "Cities of the Future" are your hometowns next week, next month, next year. What can be done to naturalize your present city? The immediate future, in the twilight of the cheap oil economy, needs urgent attention (fig. 2).

The future of urban university campuses

I want to propose that North America and many other areas of the world have potential NMM pilot communities in most large towns and cities. They are the colleges and universities that, like many traditional cities, began as pedestrian places.

The University of Toronto (60,000 students) was founded as King's College in 1827 and assumed its present name in 1849. Like most other great institutions of higher education, it grew beyond its early physical boundaries. Not every campus has had access to mass transit, including the subway and a city bike network that is found in Toronto (fig. 3). Various policies and auto

Fig. 4: Manhattan is an example of where non-motorized mobility (NMM) is usually more efficient than cars or buses. (*Source:* The author).

alternatives have spared the University of Toronto from being overcome by the auto as experience on thousands of other college and university campuses across North America.

Most urban universities have spilled beyond the original campus into business or residential neighborhoods. What has exacerbated this encroachment is that more and more students are bringing more and larger automobiles and pick up trucks to campus. In interviewing nearly 400 of the 4,000 colleges and universities in the U.S., only two had no problem with insufficient parking. Many schools have at least three times the number of cars coming to campus than the number of officially designated parking places.

So the time is at hand to determine whether campuses, which are unique microcosms of our larger towns and cities, can demonstrate that neighborhoods, towns and cities of the future can become less dependent on the single occupant vehicle (fig. 4). Are campuses able to reestablish human settlements where non-motorized mobility is available to the majority of the community?

In 1961, Lewis Mumford wrote that we should "heavily tax big cars in the city and give a break to small electric cars." Last year, London implemented an experiment that Singapore has had in place for many years: a user tax for central London roads is 5 pounds or 12 dollars per day. This has resulted in 50,000 fewer cars a day, 30 percent reduction in traffic congestion, 20 percent increase in bike traffic, 20 percent increase in taxi use, and 23 percent increase in bus use. Stockholm plans to introduce the central city car tax next. This month, Paris placed a ban on SUVs during rush hour.

A growing number of campuses are raising parking fees to be more in line with the real estate value of the parking lot or the cost of the parking structure. The increased fees and parking fines are being used to provide improved bike paths, bike service stations, bike storage and secure parking. Other investments from parking revenue include improved pedestrian safety and connectivity and in-pavement strobe lights for pedestrian crosswalks.

A college campus serves as a reasonable pilot or test site for NMM because it tends to be compact, normally offers a captive audience, and is innovative. Students and faculty tend to be somewhat more fit, more interested in sustainable healthy living and eager to set new trends. A campus is a good place to try out a "pedestrian bill of rights." Non-motorized travel experiments can be easily terminated if not successful or cost-effective.

Todd Litman, et al. (2002), Carlos Balsas (2002), Donald Shoup (1997) and Will Toor and Spenser Havlick (2004) have shown how successful university car calming practices have produced improved NMM. In these and other studies, there are at least half a dozen institutions that have distinguished themselves. Included in this list are University of California – Davis (31-40

Fig. 5: In a compact university town like Boulder, Colorado, USA surrounded by purchased open space or greenbelt, 64 percent of trips to downtown do not use single occupancy vehicles. Instead of supplying more roadways, the community's transportation demand management practices have encouraged more biking, walking and telecommuting – and have prevented sprawl.

percent bicycle use), University of Colorado-Boulder (strong bus-bike network) (fig. 5), Stanford University (pays 2,500 employees not to drive to campus), University of California at Santa Barbara (excellent bike path network), University of Washington at Seattle (ped, bike-U pass innovations), Lewis and Clark University (nearby campus housing for low cart use owners), and University of North Carolina (conversion of parking lots to bike and ped paths.

Conclusion

To conclude, if successful models of campus non-motorized mobility can be extrapolated and extended to their host communities, and to other auto-dominated settlements, we can humbly say that Cities of the Future will be healthier, more livable, more sustainable and more natural than the cities we know today.

References

BALSAS, C. (2002), "College campuses: Sustainable transportation laboratories," *Planners Network – The Magazine of Progressive Planning,* no. 153, pp. 23-26.

LITMAN, T., R. BLAIR, B. DEMOPOULOS, N. EDDY, A. FRITZEL, D. LAIDLAW, H. MADDOX and K. FORSTER (2002), *Pedestrian and Bicycle Planning: A Guide to Best Practices* (Victoria Transport Policy Institute).

MUMFORD, L. (1961), *The City in History* (Harmondsworth, Pelican Books), p. 501.

SHOUP, D. (1997), "Evaluating the effects of cashing out employer-paid parking: Eight case studies," *Transport Policy,* vol. 4, no. 4, pp. 201-216.

TOOR, W. and S. HAVLICK (2004), *Transportation and Sustainable Campus Communities: Issues, Examples and Solutions* (Washington, Island Press).

Tethered vehicle systems for sustainable cities

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Introduction: The imminence of energy constraints

What should be the main concerns of transport policy makers, in cities and elsewhere?

- Sustainability? Yes. But it means different things to different people, often quite different; bridging the differences can be a huge challenge.
- Kyoto? Yes. But it is hard to persuade Canadians that warmer winters will be a problem, or that they should prevent or prepare for sea-level rise in 2050.
- Energy constraints? Yes. It is hardly on policy makers' radar, but signs of early – perhaps profound – impacts are clear. Energy concerns should be foremost in our policy-making and shape our approaches to sustainability and climate change, and also to land-use and transport planning for urban regions.

The end of cheap oil is in sight and may already be here. After several false alarms, the prospect of major constraints on the availability of transport fuels is becoming more firmly entrenched. A consensus is beginning to emerge that world production of oil could peak during the next decade. The most authoritative perspective is that represented in figure 1 (ALEKETT, 2004). The production peak would echo the peak in worldwide oil discovery, which occurred in the early 1960s, as shown in figure 2 (LONGWELL, 2002).

Meanwhile, demand for transport fuels continues to rise, driven chiefly by growth in economic and transport activity in China and other industrializing countries, resulting in sharply elevated prices. China is now the second largest user of oil, after the United States. Her imports of oil and oil products increased by about 45 percent during 2004 (IEA, 2005).

Almost every aspect of life in industrialized countries depends on the ready availability of low-cost crude oil, whose products fuel 95 percent of transport (IEA, 2004). Notable features of the dependence are sprawling communities and long supply chains. Both will be difficult to change when oil becomes very expensive. The result could be massive economic and social disruption.

Much of the automotive industry and many governments propose that hydrogen used in fuel cells – or even in internal combustion engines (ICEs) – will replace gasoline and diesel oil as transport fuels. This scenario is unlikely. Both hydrogen and fuel cells will be too expensive.

Today, most hydrogen is made from natural gas. Discoveries of natural gas worldwide peaked a decade or so after discoveries of oil peaked (fig. 2). Thus, as world production of oil is expected to peak during the next decade, so might natural gas production peak within two decades. North American production of natural gas – the source of 95 percent of hydrogen produced in the U.S. – appears to have already peaked (SIMMONS, 2003), resulting in large increases in wholesale and retail prices. There is much natural gas in the Middle East, Russia, and elsewhere, but there are major constraints on moving it between continents. An expensive alternative is electrolysis using renewable sources of electricity.

Even with sufficient low-cost hydrogen, fuel cells could well be too expensive, unreliable, and inefficient to permit their penetration as functional equivalents to ICE-powered vehicles. According to a recent analysis, "In spite of substantial R&D spending by the [U.S. Department of Energy] and industry, costs are still a factor of 10 to 20 times too expensive, these fuel cells are short of required durability, and their energy efficiency is still too low for light-duty-vehicle applications. Accordingly, the challenges of developing ... fuel cells for automotive applications are large, and the solutions to overcoming these challenges are uncertain" (U.S. NATIONAL RESEARCH COUNCIL, 2004).

In an energy-constrained world it will make more sense to drive electric motors directly rather than use electricity to produce hydrogen that, via a fuel cell, is used to produce electricity that then drives motors. Thus, land transport systems in the 21st century could be dominated by tethered vehicles, i.e. vehicles that receive their motive energy via a rail, wire or mag-

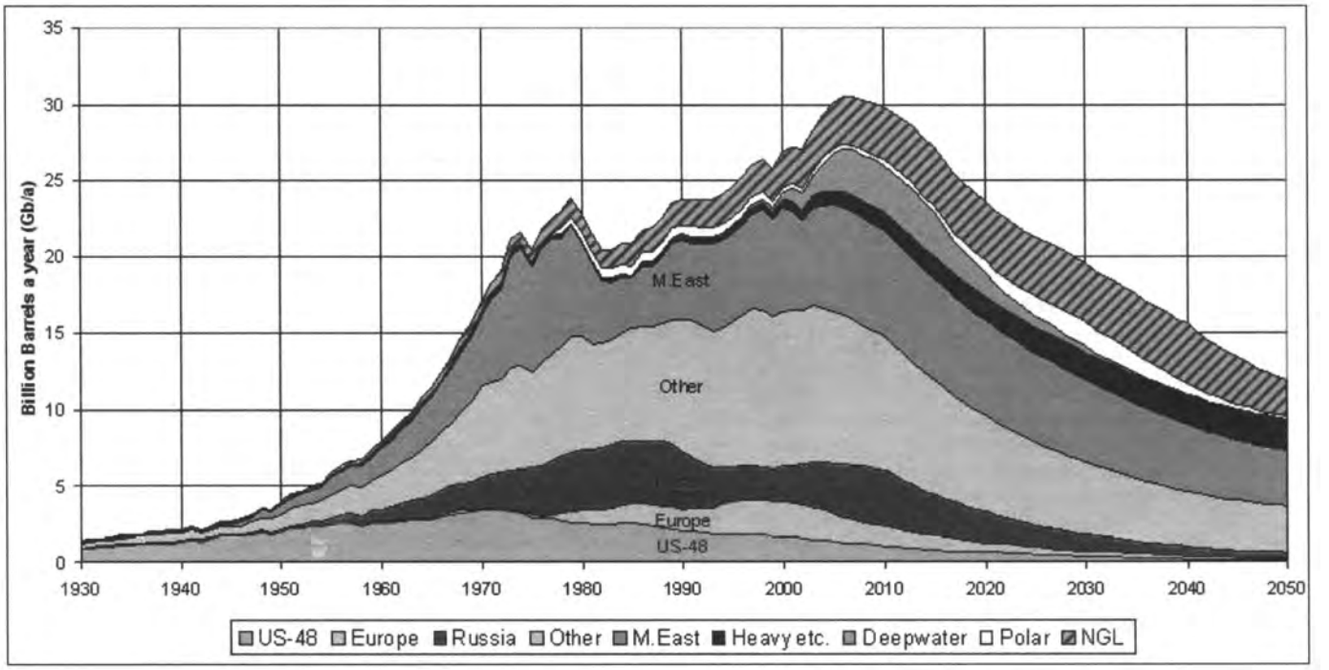

Fig. 1: World production by region of regular oil and natural gas liquids, actual and estimated, billions of barrels per year, 1930-2050.

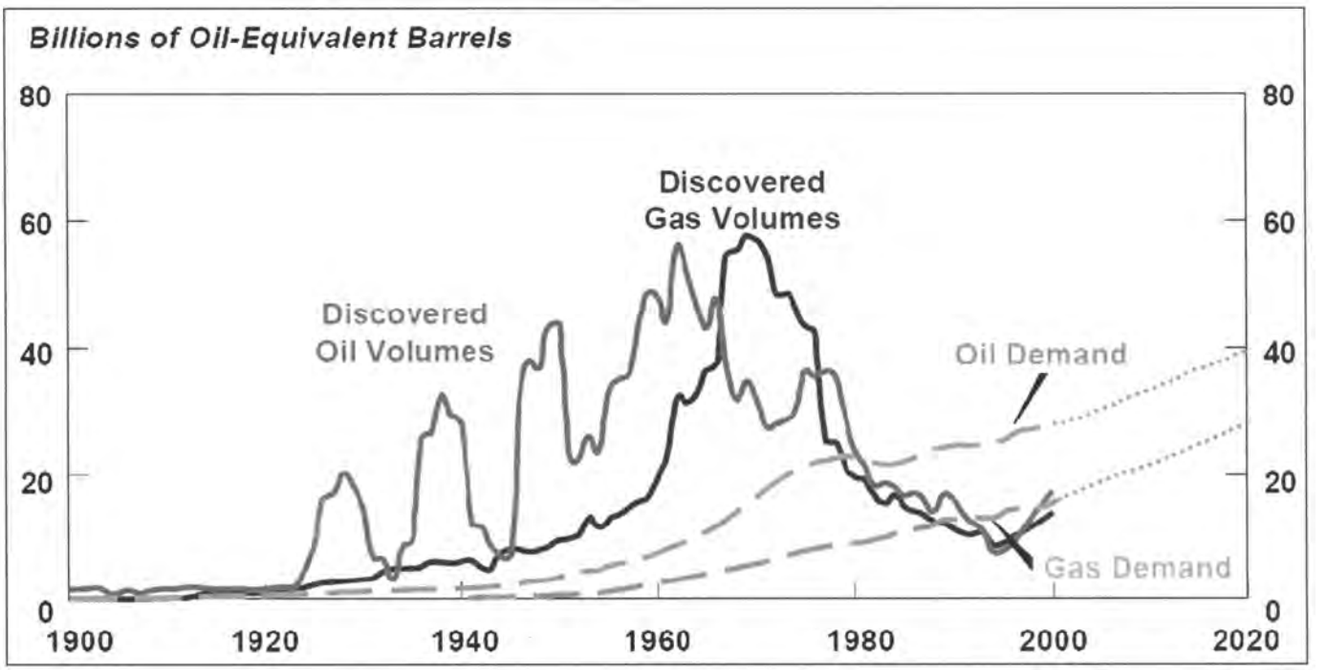

Fig. 2: World discovery of and demand for oil, 1900-2000, and projected potential demand until 2020.

netic effect than from an on-board source such as a gasoline tank or a battery.

Tethered vehicles have four relevant advantages, discussed below:

- they can have remarkably low energy intensities;
- their primary fuels can include a wide range of renewable and non-renewable sources;
- these primary fuels, and their associated electricity generating systems, can be readily substituted for one other, allowing easy transitions towards use of renewable energy; and,
- for the most part tethered systems involve familiar, tried, tested, and available technology.

Tethered vehicles have two disadvantages, also discussed below:

- they are confined to routes with appropriate infrastructure (e.g. rails and wires); and,

• they rely on continuously available, centrally provided power.

In an energy-constrained world that uses as little fossil fuel as possible, the advantages of tethered vehicles will be seen to greatly outweigh the disadvantages. Thus, what is proposed here is that cities think ahead and invest heavily in tethered systems. In the discussion that follows, the focus will be on the transport aspects of tethered systems, but the energy aspects are equally important. A fundamental question is whether sufficient electricity could be sustainably generated to support widespread tethered transport systems as well as provide for current uses. The answer seems to be "yes" (CZISCH, 2004).

Energy use by tethered and other vehicles

The superior performance of tethered passenger vehicles with respect to energy use is illustrated in table 1. In each of the three categories of vehicle, tethered vehicles show lower operational energy use.

Table 1
Energy use in megajoules per passenger-kilometer by various modes. Tethered modes are shown in italics

Vehicle type	Source	Fuel	Occupancy (pers./veh.)	Energy use (mJ/pkm)
Personal vehicles:				
SUVs, vans, etc.	A	Gasoline	1.70	3.27
Large cars	A	Gasoline	1.65	2.55
Small cars	A	Gasoline	1.65	2.02
Motorcycles	A	Gasoline	1.10	1.46
Fuel-cell car	B	Hydrogen	1.65	0.92
Hybrid electric car	B	Gasoline	1.65	0.90
Very small car	C	Diesel	1.30	0.89
Personal Rapid Transit	*D*	*Electricity*	*1.65*	*0.49*
Public transport between cities				
Intercity rail (U.S.)	E	Diesel		2.20
School bus	A	Diesel	19.5	1.02
Intercity bus	A	Diesel	16.8	0.90
Intercity rail (U.S.)	*E*	*Electricity*		*0.64*
Public transport within cities				
Transit bus	F	Diesel	9.3	2.73
Trolleybus	*F*	*Electricity*	*14.6*	*0.88*
Light rail/streetcar (U.S.)	*F*	*Electricity*	*26.5*	*0.76*
Heavy rail (U.S.)	*F*	*Electricity*		*0.58*

Sources:
A: Natural Resources Canada (2004)
B: U.S. Department of Energy (2004)
C: Transport Canada (2003)
D: Author's average of several estimates
E: Author's average of several estimates
F: APTA (2004)

Overall (primary) energy use can be much greater than operational (secondary) energy use, according to how the energy is supplied. For example, electricity produced by a combined-cycle gas turbine generator requires expenditure of about 90 percent more primary energy in the form of generator fuel as is available in the secondary energy in the electricity (WEI, 2002). Similarly, if hydrogen for a fuel cell is produced by electrolysis, the energy content of the electricity used is about 60 percent higher than the energy content of the hydrogen produced (U.S. NATIONAL RESEARCH COUNCIL, 2004).

With such conversion losses, it is important to consider the primary energy use; this is a better indicator of the energy burden. However, when the secondary energy – which provides the motive power – can be produced with little intermediate conversion, considerations of primary energy use are less important. Examples of low conversion losses are gasoline produced from conventional oil and electricity from wind turbines.

The ability of tethered vehicles to use renewable energy is illustrated in figure 3, which shows one of Calgary's light-rail trains, running with the slogan "Ride the Wind." The slogan is justified by Calgary Transit's annual purchase of 26 gigawatt-hours of electricity from a wind farm, equivalent to 100 percent of the light-rail system's consumption.

Fig. 3: Calgary's LRT system is fuelled by wind energy.

Tethered vehicles can also provide superior performance in freight transport. There are no tethered electric freight trains in North America. The comparison in table 2 is for Finland. Not shown in figure 2 are tethered versions of trucks, known as "trolley trucks," which like trolleybuses are powered through an overhead wire. They are used extensively in mining and other off-road operations (fig. 4). Data on the comparative energy use of trolley trucks and regular trucks are not available. The difference between the two is likely comparable to that shown in table 2 for diesel and electric trains.

Table 2
Energy use by freight transport in Finland, in megajoules per tonne-kilometer

Vehicle type	Fuel	Energy use (mJ/pkm)
Truck	Diesel	0.45
Train	Diesel	0.20
Train	*Electricity*	*0.06*

Source:
G: O.Andersen et al. (1999)

The particular features of electric motors that make them more efficient than comparable internal-combustion engines are:

- higher torque at low speeds, thus requiring less fuel use and a smaller engine;
- smaller engines mean less weight to carry, also meaning less fuel use; and,
- electric drive systems can have regenerative braking – motive energy is captured when decelerating rather than lost as friction heat – again resulting in energy savings. As well, tethered

vehicles do not need energy to carry their fuel.

The low energy intensities of tethered vehicles, for passengers and freight, suggest that extensive use of them should be considered as part of the preparation for an era of energy constraints.

Fig. 4: Trolley truck operating at the Quebec Cartier iron ore mine, Lac Jeannine, 1970s.

Tethered vehicles can use a variety of primary energy sources

Almost as important for sustainability as tethered vehicles' low energy intensity is their versatility in the use of primary energy sources. Any means of generating electricity for the grid can be a source of energy for tethered vehicle operations. Wind, sun (thermal and photoelectric), tide, falling water, nuclear fission, and combustion of fossil fuels and biofuels can all be energy sources for tethered vehicles.

As we move towards an energy future whose only certainty may be reduced reliance on fossil fuels, the ability to power transport by a wide variety of sources will be advantageous. Moreover, electricity is the most convenient energy currency of many sustainable primary sources, including wind, sun (photoelectric), tide, and falling water.

Tethered vehicle technology is readily available

Tethered electric vehicles have been in practical use for at least 120 years. There were streetcars on Canadian streets before there were automobiles. There has been continuous development of the technology as adoption of these modes has spread throughout the world, and as technical requirements have been enhanced (e.g. for high-speed trains).

Building on well-established technology, there are many opportunities for further enhancement, especially in the matter of personal rapid transit (PRT, noted in table 1). Because PRT could provide a convenient, affordable alternative to automobile use in low-density areas, it offers the opportunity to address what may be the most intractable of transport challenges. A PRT system could even provide for individual ownership of automobiles equipped to spend most journeys in tethered mode but the first and last few kilometers of each trip in battery mode. Provision for such dual-mode operation may be an unnecessary sophistication in places where automobile ownership is not widespread.

Another major challenge concerns road freight transport, the fastest growing source of energy use and greenhouse gas emissions in most countries. It is possible to conceive of technological development that would allow any truck, and even any road vehicle, to draw motive power from overhead wires, replacing some of it during braking.

Tethered vehicles are restricted to powered routes

The most serious disadvantage of tethered vehicles is their infrastructure requirements. At a minimum, they require wires above existing roads, and the means to power them. According to the type of vehicle, they could also require new rails or other guideways.

A similar challenge confronted automobiles 100 years ago. They were mostly confined to summer travel on roads within urban areas. In 1910, the only paved highway in Canada was a 16-km stretch from Montreal to Ste.-Rose. Present levels of route flexibility took many years to develop. Indeed, an automobile was not driven across Canada until 1946, and the Trans-Canada Highway was not completed until the 1960s. Today's automobiles and trucks may be even more confined to laid-out roads than those of a century ago, but the road system is extensive, reaching to most parts of southern Canada.

Widespread adoption of tethered vehicles for the next transport revolution could well involve continued use of the present road system, with the addition of powered overhead wires that can be shared by all. However, vehicles run more efficiently on rails or tracks than on roads, and energy constraints may favor trains and other vehicles confined to special-purpose rights-of-way.

Tethered vehicles require continuously available, centrally provided power

Toronto's streetcars and subway trains stopped during the major blackout that affected eastern North America on August 14, 2003, but cars and trucks kept moving, at least for a time. Then they were stopped in traffic jams caused by non-functioning traffic signals and by line-ups at non-functioning gas stations.

It is nevertheless true that cars and trucks have some additional resilience compared with tethered systems because they carry their own fuel. However, both depend ultimately on heavily centralized systems of energy distribution.

Greater dependence on tethered transport systems would stimulate designs for greater resilience involving more distributed production and greater redundancy. These would, in any case, be likely features of a more sustainable system of energy supply. Greater resilience for individual vehicles would require weighty battery or other storage, incurring an energy cost that might not be justified for regular use in an energy-constrained world.

Conclusion

The most feasible sustainable alternative to fossil-fuel derived transport fuels would appear to be electricity generated by renewable means. The most energy-efficient method of delivering this energy to moving vehicles is continuously through a teth-

er that carries it to electric motors from a rail or overhead wire. Alternative systems of sustainable transport promise to be less feasible and much more costly.

Energy constraints are already evident. The era of cheap oil, which fuels almost all transport, will likely end during the next decade. Preparation for an era of energy constraints, particularly in respect of transport fuel, is a matter of urgency.

Cities will be sustainable to the extent that their residents can travel within and between them, and can produce and receive essential goods and services, all with little or cumulative impact or irreplaceable resource depletion. Tethered systems address both parts of this requirement. They can provide the functionality and the low impacts that are essential components of sustainable transport.

Cities will not survive without functional transport. Tethered vehicles offer high functionality with low energy consumption. Widespread deployment of tethered systems may be the only preparation for imminent energy constraints that can ensure the survival of cities that is one prerequisite for their sustainability.

References

ALEKETT, K. (2004), "IEA Accepts Peak Oil: An Analysis of Chapter 3 of the *World Energy Outlook 2004*." Seen on February 27, 2005, at http://www.peakoil.net/uhdsg/weo2004/TheUppsalaCode.html.

APTA (2004), "*Transit statistics*" (Washington DC, America Public Transportation Association). Seen on February 28, 2005, at http://www.apta.com/research/stats/.

CZISCH, G. (2004), "*Global renewable energy potential*" (Kassel, Germany, ISET, University of Kassel). Seen on February 27, 2005, at http://www.iset.unikassel.de/abt/w3-w/folien/magdeb030901/.

HØYER, K. et al. (1999), "*Energy in transport of goods. Nordic examples.*" Seen on February 27, 2005, at http://www.ecotraffic.se/pdf/et.pdf.

IEA (2004), *World Energy Outlook 2004* (Paris, International Energy Agency).

—— (2005), *"Oil Market Report, February 10"* (Paris, International Energy Agency). Seen on February 27, 2005 at http://omrpublic.iea. org/currentissues/full.pdf.

LONGWELL, H.J. (2002), "Paper presented at the Offshore Technology Conference, Houston, Texas, May 7." Seen on February 27, 2005 at http://www.exxonmobileurope. com/Corporate/ Newsroom/ SpchsIntvws/Corp_NR_SpchIntrvw_Houston_070502.asp.

NATURAL RESOURCES CANADA (2004), *"Energy Use Data Handbook"* (Ottawa, Ontario, Natural Resources Canada). Seen on February 28, 2005, at http://oee.nrcan.gc.ca/neud/dpa/handbook_tables.cfm?Text=N&Print View=N.

SIMMONS, M.R. (2003), "*The natural gas riddle: Why are prices so high? Is a serious crisis underway?*" Presentation at a conference of the International Association for Energy Economics, Houston, Texas, December 11. Seen on February 27, 2005 at http://www. simmonsco-intl.com/files/IAEE%20Mini%20Conf.pdf.

TRANSPORT CANADA (2003), *"Advanced Technology Vehicles Program, 2001-2002 Annual Report"* (Ottawa, Ontario, Transport Canada). Seen on February 28, 2005, at http://www.tc.gc.ca/roadsafety/atvpgm/reports/annual/atvp0102.pdf.

U.S. DEPARTMENT OF ENERGY (2004), *"Hybrid vehicles"* (Washington, DC, U.S. Department of Energy). Seen on February 28, 2005, at http://www.fueleconomy.gov/feg/hybrid_sbs.shtml.

U.S. NATIONAL RESEARCH COUNCIL (2004), *"The hydrogen economy: Opportunities, costs, barriers, and R&D needs"* (Washington, DC, National Academies Press). Seen on February 27, 2005, at http://www.nap.edu/openbook/0309091632/html /119.html.

WEI, A. (2002), *"Technologies for next generation turbine systems,"* presentation at the Turbine Power Systems Conference and Condition Monitoring Workshop, Galveston, Texas, February. Seen on February 27, 2005 at http://www.netl.doe.gov/publications/proceedings/02/turbines/wei.pdf.

"Localization": A means to reduce negative transportation impacts in the "natural city"

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Introduction

Humans have evolved as a part of nature, not apart from it. When looking at nature, all species have a common need to shelter themselves and breed and feed, as well as move some distance in order to accomplish these activities. Movement can be by shoot and root growth and seed dispersal in plants, or whole or partial bodily movement in animals. Human movement across the landscape to acquire resources is, therefore, a natural process, in accordance with all other species.

With the evolution of human society came a need to move further from a home base to seek resources. This need was heightened when agricultural practices increased and distinct family groups formed that settled in one location for the duration of their lives. Nomadic wandering decreased with agriculture, which provided short-term stability in local resource acquisition but this, in turn, often led to local soil depletion, water reduction and ecosystem function degradation over time. Once shrinking of local resources occurred, groups that did not desire or could not move elsewhere due to occupation of adjacent land, would either exploit adjacent lands by force through conquering neighboring tribes and pillaging their resources, but more commonly through trade with neighbors, especially when local resources were in decline.

Ecology and human ecology

• According to ecological theory, the **"carrying capacity"** of any population is inevitably reached when the space and time scale to renew the land to provide sufficient resources is matched by the needs of the population. As populations increase in terms of the number of mouths to feed (abundance) coupled with the increased desire for a more affluent lifestyle (per capita consumption), the time to reach carrying capacity is also shortened. This time limitation thus puts more stress on the population, often causing a reactionary "fight or flight" response to threats from individuals within the population or from neighboring populations. Reaching carrying capacity under this scenario leads to massive die-off of individuals through starvation and/or killings, often until the resource stress is abated.

In human societies, this resource-driven turmoil can also lead to shifts in power (often to domineering males) where exploitation occurs on an ongoing basis as resources are further damaged in the ensuing chaos.

But there is another option in the face of resource depletion – cooperation. This can happen only if exploitation is slowed to a pace where adaptation and recovery of resources can occur to avoid undue stress.

• **Mutualism:** Reaching carrying capacity, as all populations inevitably do, can thus lead to "mutualism," a form of symbiosis or partnering between individuals, populations and even species where both parties benefit. Cooperative behavior has been exhibited in most species that undergo high resource limitations, including humans. It is under these conditions of resource limitation that cooperation is most required and employed rather than when resources are plentiful. The logic is that it is to each other's benefit if both survive through cooperative leveraging of skills to share limited resources, rather than both eventually dying off through "fight or flight" reactionary responses and further over-exploitation by both parties of the already limited resources.

The "cost" of mutualism is to give up a portion of a particular resource that you are good at exploiting or to provide your skills to acquire that resource, with the understanding that there is a benefit gained of obtaining labor or another resource that you are not good at exploiting, from the other party. For example, mycorrhizal fungi operate in low nutrient soils to provide plants with soil nutrients in exchange for sugars from the plant. Mutually, both survive these nutrient-deficient conditions through a "win-win" relationship where each is giving to the other a small portion of their energy in order to leverage remaining resources.

Transportation of goods and people

In human society, as the dominant resource of any group is decreased, alternatives need to be sought, so cooperation is required through trade in skills, labor and products in order to gain a different resource from elsewhere. Thus, movement of both skills and products across a landscape has evolved into "transportation."

Humans have now taken transportation of resources to the extreme in that global trade now is the dominant direction of movement of resources. But with "globalization" there is also

an inherent belief that an increase in intensity and expansion of resource exploitation should follow. This is opposite to the natural "paring down" of exploitation that comes with sharing limited remaining resources so that all parties mutually survive.

A root fungus that takes too much sugar from a plant and gives back little in nutrients is considered "parasitic" and will eventually be usurped by another species of fungus that provides the plant what it requires without excessive demands. The plant will evolve defences to ensure that it is not exploited. This is a similar response seen by humans in small communities toward large corporations that are seen as "parasitic" and not giving their fair share of resources back to the host community.

- **Parasitism:** And as with all parasites, if it kills the host, it too will die. Parasitism is a short-term exploitation mechanism, often evolving when resources are abundant and movement is not limited across a landscape, so that inter-generational movement is fast, but not long-lived. Disease outbreaks usually occur when population levels of a host species are high and transportation distances are short between hosts, but then parasites causing the diseases will kill off the hosts and then die off themselves. Parasites usually do not realize when they are killing their host.

Global trade and sustainability

As global trade continues, it is known to increase the "ecological footprint" (WACKERNAGEL and REES, 1995). This is defined as the space that is exploited and the turn-around time to extract and then recover those resources again while assimilating pollution. China is a good (though hardly unique) example of this phenomenon, where new exploitation of resources through partnerships is leading to over-consumption of natural resources and pollution problems, as well as social unrest between the "haves" and the "have-nots". The dominant trade model still remains that of "competition" for resources where there is a clear winner and loser, rather than "cooperation" resulting in a win-win situation.

The current global economic model thus in fact does not function economically. Economy would ensure that remaining resources are distributed fairly among players cooperating in the trade system, particularly non-human partners that are usually not accounted for, yet are the host partners and essential to support for the long-term survival of humans. This continued over-exploitation is due to carrying capacity being ignored, which naturally drove the process of cooperative trade of resources in the first place.

According to the First Law of Thermodynamics, "Energy cannot be created or destroyed." Therefore, energy is finite on Earth. The only external source is from the sun, captured mainly as matter by plants, and heat by the earth and atmosphere. Historical, stored solar energy in the form of fossil fuels also exists, but this too is finite.

With this Law seemingly ignored, global trade has attempted to keep expanding into new markets that end up becoming part of a global monopoly over particular resources (e.g. oil) controlled among a few "exploiters." Thus cooperative trade does occur, but it is shifted within segments of markets rather than fairly among peoples and communities, who are still facing resource depletion at carrying capacity levels. Global trade, then, spawns an economic model that is not sustainable over the long term as it exacerbates resource over-exploitation and has inherently too much waste generation lacking assimilative capacity.

Oversupply to a global market also results in an "all or nothing" trade system where there are clear winners or losers with larger suppliers edging out smaller suppliers in a "race to the bottom" to provide the resources for the lowest return. Transportation that meets "local" trade issues will be marginalized in favor of "global" trade due to "economy of scale" that continues exploiting resources and thus ignores limitations. This global trade network, so far, supersedes all others, but at the expense of long-term survival in the face of known resource depletion, that may yet be seriously acknowledged.

A "big box store" that uses foreign-made products with low-paid staff is still subject to carrying capacity. But, it can delay the inevitable by taking a larger share of the pie and going it alone in the short-term at the expense of long-term sustainability. Sustainability would ensure sharing of markets with diverse small business "mom and pop" enterprises by mutual agreement, and potentially skill development and product swapping. By cooperating within local economies and sharing markets, a business can keep local people employed at higher pay levels that also helps keep customers coming through the door over the long term. This was the concept that Henry Ford used to start his company; fair wages stimulate the economy and produce longevity through mutual benefit.

Global trade is also inefficient in terms of the distances for transportation of these goods that should be meeting local needs. The last 250 years of cultural evolution into a global trade market has resulted in faster modes of transportation with personal vehicles able to travel long distances to enable this long-distance resource exploitation. "Localization" would reduce the impacts of transportation for acquiring resources, both of goods and commuters.

The desire to move products over long distances from offshore markets to facilitate "just in time" delivery has also increased the need for larger and more abundant road infrastructure. This has caused a massive "paving over" of urban areas to the detriment of nature and its ability to renew itself, also resulting in pollution from vehicle emissions, as well as from the factories that operate our car-based culture.

This personal mode of transport has also spawned low-density car-designed urban and suburban areas, for which car access is invariably planned. This has resulted in perpetual grid-lock of our cities, exacerbating the need for wider and more roads (more pavement) and furthering air and water pollution. The World Health Organization reports that 3 million people die annually from air pollution compared to 1 million from vehicle accidents. The Ontario Medical Association estimated the number of premature deaths in Ontario as 17,000 in 2005, rising to 24,000 by 2026.

Localization: Towards a realistic, ecologically sound future

We will never eliminate the need to travel, nor the accustomed mode of travel in "developed" nations: the car. This expectation of private travel is inherent in our North American way of thinking as a society where individual rights are paramount. Planning for mass transit is not feasible in smaller communities, nor is it feasible for cash-strapped communities, or where past planning has not allowed its accommodation in already built-up areas. And given our "need" to compete in a global market, the pace of living has increased to allow for faster exploitation of resources; that is, producing "affluence." Public transit is most often slower and less convenient than personal vehicles so it remains the less-desirable mode of transportation by the majority of people.

The more realistic solution, given the current mindset of the average "Westernized" society member, is to look at reducing the number and distance of trips, as well as prohibiting vehicles within certain areas that are deemed "car free."

- **Re-designing cities as living ecosystems** to provide for local resources would also reduce the ecological footprint of

cities. Currently, most planning practices ignore the need of food and water security, which, ironically, are the only needs that must be met for basic survival. Housing (shelter) dominates the landscape (providing for breeding and comfort), but the basic necessity of food supply through globalization is taken for granted and ignored in city planning.

The Toronto area now contains a Greenbelt around it, but food security was a minor item of attention that was not seriously considered as necessary for protection under planning policy. Two "specialty crop" areas that grow grapes and tender fruit (Niagara) and vegetables (Holland Marsh) were protected, but the remaining Class 1 arable farmland was left out of the Greenbelt for "future expansion" of the megalopolis limits for housing.

What was not considered was the essential rate of global trade that relies on oil to transport goods and the difficulty in supplying sufficient amounts to meet a growing demand, spurred by globalization and new market exploitation itself. Transportation of resources relies solely on this historical solar energy in the form of oil, which is a limited and rapidly diminishing resource.

- **The protection of prime agricultural land** as a resource close to cities to reduce transportation distances is an essential element of localization that stems from trading between nearest neighbors.

Currently, farm products are at their lowest levels in terms of price as they compete on a global market that is highly competitive. The localization of farm products will establish a mutual relationship between urban and rural communities that is beneficial to both, and that leverages remaining limited resources namely oil supplies. Currently, rural farmers are suffering as city residents act as parasites on the global supply chain; those who do best are able to engage local consumers as partners. This is a small proportion of the market to date, but cooperation within local areas is a natural process that likely will evolve as oil supplies dwindle and carrying capacity limits are felt by local residents. Affluence is still being artificially propped up by the exploitation of global resources from less affluent countries, usually under short-term parasitic relationships rather than mutually and equitably beneficial sharing of resources.

- **Climate:** Localization of communities would reduce the need for further paving for travel in cities to accommodate a burgeoning population of vehicles, as well as reductions in air pollution and carbon emissions promoting climate change. This would allow for restoration and renewal of natural areas and plant and animal life that provide natural services and mitigate climate extremes. Evapotranspiration and shading/temperature are both triggers for what type of weather occurs in a local climate. Plants and soils are the main controllers of weather, as is pavement. Too much pavement results in extreme conditions that are not off-set or absorbed by plants and soil.

Abnormal alteration of climate is considered the largest threat to global stability, yet is still ignored or even derided as "false" by many global market players. Again, parasites do not often know when they are killing the host until it is too late. Local planners also ignored climate change and the role that nature plays in altering local weather as well as absorbing its extremes. The Ontario provincial "Places to Grow Act" that is the new planning document for the Greenbelt area only mentioned climate change once in reference to reducing energy use to mitigate climate change. No reference to the loss of nature or biodiversity was mentioned in terms of its effect on climate although the "urban heat island effect" is well-documented, as is climate change.

Climate change will speed up the time to top carrying capacity limits, causing extreme stress and thus the "fight or flight" response. It will also alter the ability of the natural world (the unacknowledged partner) to provide for resources to the human population. As partners in nature, humans have evolved to be reliant directly on exploiting resources over larger areas and slower temporal scales that give rise to mutual relationships with nature as resources ebbed. Societies that were successful and survived long term gave back to nature, often honoring it, as can be seen by the extant indigenous cultures today. Those cultures that have recently evolved (Western cultures) have not matured enough to recognize that nature is the ultimate partner. A mutual relationship with nature that is based on localization is required for the long-term survival of society and cities.

- **Movement of people:** Localization would also lead to a planning and design regime that would promote walking and biking locally, thus improving health and attracting new residents. This would increase the diversification of local community businesses that would employ local residents. "Live-work communities" have yet to be fully realized in planning for urban or suburban Toronto areas, but attempts are being made within neighborhoods to "buy local" to support small local businesses (BALLE). The issue of where the goods that are being purchased come from has yet to be addressed though. Ironically, many local businesses that individually transport small quantities of goods daily into a neighborhood, may in fact cumulatively cause more traffic woes and pollution problems than one large centrally-located business (i.e. big box store). The central issue of moving commodities, not just commuters, has yet to be addressed in planning.

Conclusion

The best chance of changing this pattern of movement of goods is to adopt a "localization mandate" for all cities and towns through planning policies and good planning to address transportation issues that have spawned historic "pavement, pollution and poor planning" practices. We need to change planning practices toward sustainable communities that are based on mutualism and cooperation and giving back, rather than parasitism, over-exploitation and taking.

A rethinking is needed of the way goods and people move across landscapes to provide for human "breeding and feeding" in order to promote a truly "natural city." All species attempt to minimize the energy expended to meet their daily caloric needs. Our ways of acquiring energy are literally "sucking the life" out of the earth as our urban areas act like huge vacuums of global products. Minimizing our ecological footprint requires also minimizing our reach on a daily basis. Hence, there is a desperate need for localization.

Localization has been primarily attempted through the Farmers' Markets and Slow Food Movement that are now bringing local produce into city centers on a weekly basis and providing dining experiences in local traditional restaurants. A small business sector that adapts to local needs will thrive if a cooperative approach is used among various industries to supply a variety of goods and services.

This type of shift in thinking and practice needs to be generated among all businesses. With the decline in global fossil fuel reserves and the ever-increasing climate change, and ever poorer air pollution and degradation of nature, localization will not only be desirable, but absolutely necessary.

Reference

WACKERNAGEL, M. and W. REES (1995), *Our Ecological Footprint: Reducing Human Impact on the Earth* (Gabriola Island, BC, and Philadelphia, PA, New Society Publishers).

Sustainable housing design and the natural environment

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Introduction

The contemporary environment today has been undergoing many changes. Particularly the interference of human activities with the natural environment adds new dimensions to the ecological equilibrium of the world. There is a general acceptance, regarding the environmental crisis on both local and global levels that the present form and degree of resource exploitation and associated consumption practices are unsustainable.

The very development created by humankind for reasons of comfort is threatening all forms of life. Never before in history have human beings had such an impact on the Earth. The resulting problems are a product of the size and growth of population, quantity of consumption and quality of technology. The range of urban environmental challenges varies according to income level and spatial level of impact. Problems of urban waste and pollution are inextricably linked to poverty and productivity, as well as broader macroeconomic performance. The poorest cities are most affected by environmental health problems that are largely contained within city boundaries. Also, within the city, the poor are typically more exposed to and affected by urban environmental insults. Urban areas supporting a higher level of economy, are plagued by sophisticated pollution and waste problems that are citywide to global in nature.

Much of the world is currently experiencing intense growth, especially in and around cities. Unfortunately, the development that such growth entails is often at odds with the natural environment. Cities may increasingly be the causes and the victims of environmental ills. However, cities also have the resources to prevent and cure their environmental problems. The concentration of money, intellect and organization in cities also results in a higher demand for environmental quality. So, cities offer an opportunity for reducing industrial and transport-related pollution (LEITMANN, 1999, pp. 10-11).

In most cities, over 80 percent of urbanization consists of housing (OKTAY, 2001, p. 5). For this reason, housing has an important impact on the quality of the environment. Accordingly, housing design must be based on the **participation** of users and principles of **sustainability**, to provide for long-range user needs while reducing energy use.

New forms of development, combining technological progress with greater equity, uplifting and safe natural and built environments, are possible. Developing sustainability in every field is the central task for people and governments. In this paper, sustainability will be considred with special attention to housing design. But before that, there is need to give a brief definition of the concept of sustainability.

Sustainability

The concept of sustainability certainly addresses excessive use of finite resources and the efficient management of the ecosystem, greenhouse gases, storm water pollution, efficient food production as well as fundamental concerns for social equity and social justice. The idea of sustainable development aims to ground the human standard of living on the carrying capacity of nature (ATAKARA and TANRIKUL, 2004, p. 441).

In contrast to the commitment to ruthless development, sustainable development has to be understood as a kind of development which is qualitative and controlled. Development in general should not be abandoned to market forces, but must be one of the responsibilities of the state. With this understanding, all public policies must prevent any further reduction or degradation of natural, cultural and social capital.

Nature conservation is central to the notion of sustainable development. Indeed, sustainable development was put forward

as a concept partly as a means of promoting nature preservation and conservation (ADAMS, 2001, p. 25). A generally accepted definition of sustainable development can be found in the Brundtland Report: (UN, WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, 1987):

> ... Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

The concept of "sustainability" has progressed with "Agenda 21" which was developed after the Rio Summit by the European Union in 1995. According to Agenda 21 principles, value resources means valuing existing building stock as both physical material, as well as embodied energy, and cultural resources and heritage of people. Part of the process of advancing sustainable development involves requiring local and regional authorities to carry out audits of "present conditions," which include the social, economic and cultural contexts. The thrust of Agenda 21 is that sustainability should be incorporated into all regional plans, and community participation is a key activity to ensure that those ultimately affected by development proposals are fully represented (FARMER, 1999, p. 211). The Rio model has clearly increased the number and parameters of the concept. For the first time, politicians and the broader public have realized that the destruction of the environment does not come only from directly perceptible causes such as poverty, the consumerist model of living, inadequate education, the exclusion of social groups from decision making, and other similar factors.

One can assume that the Sixth Environment Action programme of the European Union, called Environment 2010: Our future, our choice (2001-2010), has been widely affected by the basic philosophy of sustainable development. In fact, one of the principles of the EU program suggests that, since individual citizens make daily decisions that directly or indirectly impact the environment, better quality and accessiblity of information on the environment and on practical matters will help shape both beliefs and decisions. Information for citizens must aim at encouraging more sustainable lifestyles. Accordingly, the Sixth EU Environment Programme sets primary priority areas for action as tackling climate change; preserving bio-diversity, environment and health; sustainable use of natural resources and management of wastes, that relate to designing sustainable dwellings.

Sustainability represents a balance that accommodates human needs without diminishing the health and productivity of natural systems. The American Institute of Architects defines sustainability as: "the ability of society to continue functioning into the future without being forced into decline through exhaustion or overloading of the key resources on which that system depends" (MENDLER and ODELL, 2000, p. 1).

Sustainability is a shared responsibility. Co-operation and partnership between different levels of society, organizations and interests is therefore crucial (VLAVIANOS-ARVANITIS, 2002, p. 27).

Although sustainability is one of the most significant concepts of the past two decades, the idea of sustainability is not new. Traditional planning and building methods were often good examples of sustainable design in their time, and represented wise uses of local resources matched with local skills. In combination, they produced a built environment which met human and environmental needs. However, factors such as demographic growth, and shifts from rural to urban areas create an imbalanced population distribution, natural and human-made resource depletion, and significant changes in expectations and lifestyles, all of which combine to erode the viability of traditional approaches to shelter provision. A building method that worked well in the past in its given context may have now become difficult to afford, build and maintain, and it may no longer meet the desired requirements of the family or community (OKTAY, 2001, p. 2). But it is essential to look to buildings in the distant past for ideas about how to build in the future. Indeed, before the advent of air-conditioning and other technologies that are now taken for granted, architects and builders had no choice but to create sustainable structures. In the late 19th century – before electrical heating, cooling and illumination – architects used a combination of mechanical devices and "passive" techniques (which worked without electrical or mechanical equipment) to illuminate and ventilate the interior spaces of even high-rise and long-span buildings.

Most conventional practitioners of modern design and construction find it easier to proceed as if nature and a sense of place did not exist. Rather than rely on depleting fossil fuel resources, an ecologically aware design would investigate local energy sources, the availability of sunlight, shade and water, the vernacular architecture of the region, the lives of local birds, trees and grasses. That kind of design preserves aesthetic, economic, social and ecological values. By finding ways to create buildings that consume less energy in their day-to-day operation, use renewable materials and rely on natural means to ventilate and illuminate their interiors, architects, engineers and builders come closer to the goal of true sustainability (GISSEN, 2003, pp. 10 and 11).

Matter and energy cannot be created or destroyed. Matter and energy tend to disperse. This means that any and all matter that is introduced into society will never cease to exist and will, sooner or later, find its way into the natural system. Toxic materials are no exception. They, too, will disperse and find their way ultimately into people's bodies. These are scientific principles; people can ignore them, but they will not disappear (MENDLER and ODELL, 2000, p. ix). So, humanity must learn to live without exhausting the resources of the world in order to survive. This can be possible only by sustainable design practices. Principles of sustainability can be grouped under four headings:

- Fuels, metals, and other minerals must not be extracted at a faster pace than they can be redeposited and reintegrated into the earth's crust, turning them back into nature's building blocks.
- Human-made materials must not be produced at a faster pace than they can be broken down and integrated back into the cycles of nature.
- The productivity and diversity of nature must not be systematically diminished.
- In recognition of the first three conditions, there must be fair and efficient use of resources to meet human needs. This means that basic human needs must be met in the most resource-efficient ways possible, and meeting basic needs for all must take precedence over providing luxuries for the few.

Living in rapidly growing cities, human beings must search for ways to build today with available resources. Architecture does not end with its foundation and outer walls: urban planning, as well as, interior, landscape, product and systems design are part of sustainable architecture (CROWTHER, 1992, p. 89). High-rise construction removes people from nature. Housing is, in many respects, a central setting for individuals with high psychological and social significance. Accordingly, the provision of housing is an important need in the development of any city.

Sustainable housing design

Over the past two decades, sustainable design has been in the process of being defined world-wide. Sustainable housing design is the kind of design which respects natural resources, and embraces, human, cultural, and historical significance.

Architecture is an intervention upon Nature. It protects human beings from the intensities of solar exposure, climate and other humans (CROWTHER, 1992, p. 86). Besides, architecture is a reflection of the contemporary society in attitude, customs, desires, needs and technology; and in present-day society, natural coherence and sustainability become important priorities in

the process of design. Sustainability in architecture requires efficient and healthful interior solar and climatic space planning. The relationship of the interior spaces with the exterior spaces has to be strong and the integration of nature with architechural design has to be provided for.

Modern technology and methods of construction have sadly degraded natural resources – agricultural land, forests, air, and water. There has been a loss of energy on the Earth because of misuse of resources. Sustainable design assumes that this misuse can no longer be sustained, because the world's population is expected to be more than double in the next 50 years. One of the defining features of the machine-age 20th century is how people have become separated and sealed off from the environment. Whether in air-conditioned buildings, shopping centers or theme parks, technology has been used to construct a world that removes people from nature (FARMER, 1999, pp. 209-210). Sustainable design requires a fundamental change in mind set and a change in values towards less consumption and more environmental awareness.

Individuals and groups play an important role in the creation of their habitats. At the same time, sustainable housing provides opportunities for long-term flexibility and adaptability. As far as housing is concerned, local sustainable development deals with improving the quality of life of the local community through the prudent use of local resources. The aim, therefore, is to achieve a high degree of local self-sufficiency, which is related to ecological site design as a determinant of urban ecology.

In this context, as energy use is largely determined by the density of layout, location, orientation, etc. of the original design, designers and builders can exert a great deal of influence over improvement in sustainable design (OKTAY, 2001, pp. 5 and 6). It is important to keep in mind that sustainable housing design is not a new approach to building. It has in some sense existed since people first selected a south-facing cave rather than one facing north to achieve comfort in a temperate climate. The discovery of the vernacular building by local people using local materials adapted to local climatic conditions was the beginning of sustainable architecture. In such shelter, humans recognized one supreme and absolute limitation: the impact of the environment, which included building materials which the local environment was able to afford. Primitive architecture reveals a very high level of performance, even when judged in the light of modern technology. It reflects, on the one hand, a precise and detailed knowledge of local climate conditions and, on the other, a remarkable understanding of the performance characteristics of the building materials locally available. So, an understanding of primitive architecture is important because, with the rapid industrialization and urbanization of the Western world, there is a growing tendency to minimize or ignore the importance and complexity of the natural environment.

Criteria for sustainable housing design

Human and environmental needs have largely been neglected in modern developments that emphasize such factors as growth, speed, and intense, chemical stimulants. Despite the fact that building designs themselves have greatly improved over the last few decades, more thinking needs to be done about the relationship of architecture to the community and the environment in order to enhance sustainability.

Many factors account for the shift toward a more human and contextual design approach. One of the most significant has been community-based development organizations. Local organizations embody the goals of social justice, such as participation, empowerment and accountability in the communities they serve (OKTAY, 2001, p. 8).

Energy

First-wave societies drew their energies from human and animal muscle power; or from the sun, wind and water. Second-wave industrial societies began to draw their energy from irreplaceable fossil fuels – oil, coal and natural gas. This revolutionary shift meant that, for the first time, a civilization was eating into nature's capital, rather than merely living off the interest it provided. Third-wave civilization must draw on a variety of energy sources – hydrogen, solar, geothermal, perhaps advanced fusion power – as well as other energy sources not yet imagined (ONAL, 1997, p. 26).

The design of vernacular houses varies from region to region according to the natural resources available. Their energy consumption has to be low because of limited resources.

After World War II, architects explored the potential of air-conditioning for high-rise, mid-rise and long-span spaces, that reflected a move away from passive strategies. These buildings featured an entirely new language of smooth-skinned glass-and-steel boxes without operable windows, ventilators or external sunshades. With the development of low-wattage fluorescent lighting that did not emit much heat, the floor area of these structures widened to the point where natural light was replaced completely with artificial light.

The affordability of these new buildings and the fossil fuels used to drive the generators that powered them explains, in large part, why passive environmental control was phased out. The consumption of fossil fuels is one of the biggest environmental problems. Drilling in ecologically sensitive areas, oil spills, air pollution and the destruction of the atmosphere all result from the incredible demand for fossil fuels. Cars and factories are often considered the most obvious enemies of the environment, but buildings consume more than half the energy use worldwide. Mechanical systems that supply air-conditioning and heating, lighting systems, and other building technologies have to be redesigned to consume less energy – and alternate sources of energy have to be developed. Building owners can purchase energy made from renewable or clean sources (solar, wind or hydroelectiric), and architects can design buildings that generate their own clean and renewable energy (GISSEN, 2003, p. 19).

The energy needs of buildings relate to the elements of climate:temperature, wind and availability of light. Particular climate-related needs of all types of buildings vary from south to north, from one climactic region to the other. However, there are some needs which are common everywhere in the world: heating, in winter and at night; cooling; day lighting, whenever available; ventilation, some natural and some forced.

Depending on the regional climate and the predominant need for heating or cooling, three major strategies are available (ONAL, 1997, p. 83):

- in cold weather:
  - maximizing solar and other free heat gains,
  - providing good heat distribution and storage,
  - reducing heat losses and allowing for suitable ventilation;
- in warm weather:
  - minimizing heat gains,
  - avoiding overheating, and
  - optimizing cool air ventilation;
- replacing electric lights with the use of natural light.

The usage of photovoltaic panels on buildings generates electricity from sunlight. At present, this system is being used mostly for high-rise buildings but it can be expanded to residential buildings.

Buildings consume at least 40 percent of the world's energy. They account for about a third of the emissions of heat-trapping carbon dioxide from fossil fuel burning and two-fifths of acid rain-causing sulfur dioxide and nitrogen oxides. So, in building designs, the reliance on fossil fuels has to be reduced and the

use of cleaner sources of power has to be explored. Fuel cells, photovoltaics, solar hot water, and other renewable energy sources have to be considered in building designs.

The reduction of energy consumption for the illumination of the buildings is also important. There have been substantial advances in the efficiency and quality of lamps. The coloration of fluorescent lamps has improved, so designers no longer need to use incandescent lighting to create a "warm" interior. With incandescent lamps, only 10 percent of the energy emitted is in the form of light – the other 90 percent is heat (MENDLER and ODELL, 2000, pp. 9 and 10).

Climate

Without the benefit of abundant energy, past communities had to work with their climate. In hot dry climates, for example, buildings were shaded to avoid the unbearable heat of the summer sun by tall vegetation, rock overhangs, or by the courtyard building form; they were also oriented to receive the pleasant warmth of the winter sun. Massive walls keep buildings cool in summer, as do high ceilings vented at the top to increase air flow. Ancient builders learned to design houses to take advantage of the sun's energy during the moderately cool winters and to avoid the sun's heat during the hot summers. Thus, solar housing came into being – designing buildings to make optimal use of the sun by responding to its changing positions during different seasons.

Solar principles and other local climatic qualities were used not only for single, isolated villas but for groups of houses within an urban context as well. Villages and small towns were planned to receive benefits of the sun with optimal community and building plan shapes, east/west street orientations, and good solar access to most buildings and outdoor public places (OKTAY, 2001, p. 34).

Architecture itself as a fixed state construction has to contend with the dynamics of people and the dynamics of the sun and climate. Within its "fixity," adaptive ecologic attributes can be given to architecture by design (CROWTHER, 1992, p. 80). Architecture must be a response to climate (McCARTHY and BATTLE, 1998, p. 62). In colder climates, comfort depended on shelter from prevailing winds by siting, land form, and vegetation, together with low ceilings, thick walls, and windows on the exposed side. In the extreme cold (as in the extreme heat), buildings were buried in the earth or covered (ONAL, 1997, p. 27). Northern facades usually have only a few openings, whereas the southern facades contain the main openings, thus maximizing the benefit of the limited sunshine. The ideal orientation for buildings in such a climate is with their long axis running east-west.

In wet areas, houses were raised above the ground or had raised floors, with a steep pitched roof and overhanging eaves. Each region has its own climatic conditions and cultural patterns, which must be the basis for solutions in each individual case.

The use of solar energy in building forms has challenged designers from ancient times and continues to do so today. There is a broad range of use for solar systems, from space and hot-water heating, to natural lighting and electricity production. The enormous benefit of a solar system is in the use of a pollution-free, renewable energy source – the sun. The solar trajectory affects the amount of radiation received on vertical surfaces: in winter, a southerly-oriented surface receives a lot of radiation, because the sun is low, but any other orientation would receive much less solar energy. In summer, on the other hand, when the sun is higher at noon, a southerly-oriented surface receives less direct radiation, while a westerly or easterly orientation is heavily impacted during the evening or the morning hours (VLAVIANOS-ARVANTIS, 2002, p. 56).

Climate and the need to heat or cool a building plays a major role in the design of the external envelope – transparent elements like windows and sunspaces, walls, roofs and floors – of a building. By improving the building envelope, passive solar strategies can be developed to improve comfort and reduce energy demands (MENDLER and ODELL, 2000, p. 9). There are various factors which affect heating, cooling, etc. in a building (ONAL, 1997, p. 106): The thermal inertia or mass of walls, floors, partitions and roof influence the rate of temperature change inside the building. External colors and surfaces affect heat absorption and reflection. Insulation of the external envelope and; reduction of infiltration can reduce heat loss. Contact with the ground can help to keep a building cool in summer, with moderate heat loss in winter. Designing with outside air in mind can be useful for cross- ventilation and cooling.

Estimating the microclimatic influences of wind is more difficult and uncertain. In winter, cold winds increase heat loss, by cooling the external fabric, and by increasing the air infiltration through openings. Shelter-planting and topography can act to reduce wind speed, and hence reduce heat loss. The reduction of wind flow has to be provided without reducing solar gain. This improves the comfort in adjoining outdoor spaces also.

In summer, it may be useful to direct the prevailing wind flow, by vegetation or topography, so as to funnel cooler breezes through the building in order to reduce the cooling load (ONAL, 1997, p. 88). The density and the heights of the buildings are significant in reducing the effects of the harshest weather conditions. Wind tends to pass low in densely built areas, but it is caught, directed downward, and intensified by tall, free-standing buildings.

Natural forces can be used to define form in architecture so that design is not only about art, but also includes a thoughtful physical response to the environment (McCARTHY and BATTLE, 1998, p. 62).

Building materials

A vernacular building lacked the benefit of cheap, mass-produced imported materials. It relied, instead, on largely local resources and skills. Depending upon local materials, the colors and forms of vernacular buildings often harmonized with their settings. Certainly, building materials can enhance or negate climatic advantage. Moreover, the sensual perception of an interior space is largely determined by the materials which line its surfaces; as light is transmitted and refracted through materials, or reflected by the texture and color of the internal surfaces, its quality and utility are established (ONAL, 1997, p. 25).

To be sure, the environmental impacts and resource use of proposed building materials have to be evaluated. Raw material sources, modes of production, and transport to the site, installation and use, and finally disposal or reuse should be questioned and evaluated prior to making a selection.

Nontoxic materials have to be sought from local, renewable, sustainably acquired resources like wood products and naturally processed products (VLAVIANOS-ARVANTIS, 2002, p. 52), that minimize pollution from manufacturing, installation and maintenance (MENDLER, 2000, p. 11). Many contemporary building materials are made using harmful chemicals, such as polyvinyl chloride (PVC), polycarbonate, and substances which deplete the ozone layer. Traditional, natural building materials such as adobe, straw-bale and bamboo are sustainable materials. They avoid adverse environmental impacts in their fabrication and are energy-efficient.

A report by the World Resources Institute projects a 300 percent rise in energy and material use as world population and economic activity increase over the next 50 years. If industry can become more efficient, using fewer resources to provide the goods and services people want, economic growth can be sustained. This idea is often called eco-efficiency and influenced architecture as well. "Reduce, reuse, recycle" is eco-efficiency's

popular mantra. Recycling building materials is one of the techniques being employed to reduce the environmental impact of buildings.

But in some conditions recycling can be problematic. Mixing construction materials not designed to be recycled can be quite destructive. Most recycling is actually downcycling, with materials losing value as they circulate through industrial systems. The strength of steel, for instance, is compromised when it is mixed with other metals in the recycling process. Recycled steel from the U.S. and Europe is used for building construction in Asia and its wide use in Turkey may have been responsible for the collapse of so many buildings during the earthquake that rocked the country in 1999.

Mixing metals dilutes their value and increases the impact of materials. When rare and valuable metals such as copper, nickel and manganese are blended in the recycling process, their discrete value is lost forever. A materials passport, much like the bar code on consumer goods, could change that. The passport would essentially guide materials through industrial cycles, routing them from production through reuse.

Another approach to reduce resource consumption is using less construction material. Dematerialization, as this strategy is often called, searches the possibilities of getting maximum performance from minimum materials. It states that: Lightweight fiber reinforced composite materials, intelligently composed, can yield structural strength while dramatically cutting resource consumption. Efficiently constructed buildings cut waste and light materials minimize resource consumption.

Rematerialization is also important for sustainable design. In the industrial world, it refers to chemical recycling that adds value to materials, allowing them to be used again and again in high-quality products. The process is modeled on nature's nutrient and energy systems, which perpetually recycle materials in closed-loop cycles. Industrial ecology applies the structure of these natural systems to the management of industry's material flows, so that all products and materials, after their useful commercial lives, can be returned to the soil or circulated in industry forever.

Architects have to select materials that are safe, and even benefical, for human and environmental health. In buildings, materials that provide nourishment for nature or are recyclable, have to be used. Just as in nature, when the by-products of one organism become food for another, the flow of these biological nutrients and technical nutrients in their respective cycles eliminates the concept of waste.

Insulation is also crucial to both health and performance buildings. Rice-husk insulation and rice straw are safe, effective, inexpensive, totally biodegradable, and produced with a renewable resource (BRAUNGART, 2003, pp. 118-122).

Indoor air quality

Air is an essential resource for supporting life, a unifying substance for mankind. Every molecule of air we breathe has a 99 percent chance of having been breathed before. Air knows no boundaries or borders, yet it is not recognized as a finite resource. As trees and other plant life – the planet's natural systems for cleaning air – are destroyed, the problem becomes more acute.

An analysis of global carbon emissions reveals that between 40 and 50 percent is generated by buildings, 25 percent is from transport, and 25 percent comes from industrial sources. This places a heavy responsibility on the shoulders of the construction industry. Designers need to address not only the issue of providing clean air for the occupants of buildings, but they must also ensure that buildings do not pollute their surrounding environments. This challenge is the key to the development of a sustainable future.

Settlement and land use

Today, it rarely happens that human beings have the opportunity to settle on virgin land. From birth people are "thrown" into a pre-existing, human-made environment, to which they have to adapt, often without a choice. An already existing place has to be understood as a settlement, and the construction of a new building within an old context is also, in a certain sense, an act of settling.

For a truly sustainable environment, there is need to maximize the exchange between services whilst minimizing the travel necessary to do so. This implies as much variety of activities as possible, easily available within a walking distance of where people live and work (OKTAY, 2001, p. 25). So links to public transit and strategies for pedestrian-friendly, mixed-use, livable communities have to be developed. To encourage the use of mass transit, higher-density mixed-use developments have to be located around transit nodes. To encourage pedestrian circulation, streets can be animated with retail space at street level, and the use of pedestrian networks can be promoted to connect neighborhoods, offices, schools, and shopping centers (FARMER, 1999, p. 8). The greater the self-sufficiency of site and architecture, the less the environmental impact.

Some major objectives can be put forward regarding building location and siting in sustainable housing design which are:

- locating the building to benefit from the best available microclimate;
- considering both insulation and shelter when heating is required;
- considering prevailing breezes for cooling;
- respecting views and profiles of the skyline;
- respecting the elements and cultural significance of the urban (or rural) landscape.

The sustainable community integrates housing of mixed size and type appropriately within the overall community design. Integration, as opposed to segregation, is an objective of sustainable communities, accommodating individual and community needs and aspirations.

Participation

The fragments of dwelling traditions uncovered in Anatolian excavations cover a time span of about 10,000 years. Ten thousand years ago, the house was not a single entity, but part of a compound. Starting from primitive shelter, the function of housing tries to address the same issue: how to live safely. The concept of safety may change, but after millennial developments, there is still the usage of walls, roofs, windows and doors. The house – the most individualistic concept of any architectural tradition, the most societal of artifacts – is the most personal, but the most common object of production which expresses humans in their most intimate moods.

Concepts concerning human dwelling have changed in the 20th century, first slowly, then with the development of megapolises, very rapidly. While people still cherish the idea of owning a house, they forget to expect a "personality" from it. The house in the modern world is a consumer item, a neutral product, like a box. The individuality of one's own house has become a rare luxury. If modern man still has an individuality in his private environment, it may be found in the hidden corners of some room (KUBAN, 1996, pp. 1-5). So, the reintegration of the designer and builder is part of the social development of sustainable housing.

Identification

In general, identification means to experience a "total" environment as meaningful. Human identification means to relate meaningfully to a world of "construction." Human beings are not born

in isolation, but are part of a structured totality. Identification, thus, means to gain a world through the understanding of an existing environment. In general, the existing environment has to be interpreted by humans to become an inhabited world.

All landscapes are characterized by an atmosphere which maintains its identity through climatic and seasonal changes. This atmosphere is of essential importance because of its unifying role in the environment, and identification also consists in being open to such an environmental character. Identification is never separated from daily life, and is always related to human actions (NORBERG-SCHULZ, 1985, pp. 18-20).

Cities, buildings and society that define and constitute each other are parts of the same eco-system. In response to many factors, cities are always changing. Therefore, the urban environment has to be considered as an evolution of the local urban fabric, with respect to human activity and built form. This is also significant in the creation of "a sense of place," an important factor in achieving identity in urban settlements.

Considering the identity theme, the neighborhood strengthens the bonds between residents and between themselves and their environment. The process of neighborhood planning is seen as a way to provide the real needs of the residents. The definition of the neighborhood (its size, borders, etc.) is drawn from the requirements, expectations and lifestyles of its residents (OKTAY, 2001, pp. 11-12).

One of the requirements of a neighborhood is transportation. Neighborhood streets are public spaces that should comfortably and deliberately accommodate a variety of transportation means, especially pedestrians and bicyclists. Sidewalks and public transit offer an attractive and reasonable alternative to driving when they are safe, attractive and most importantly, lead to places where people want to go (VLAVIANOS-ARVANTIS, 2002, p. 47). Safe, well maintained, attractive and uncluttered public spaces provide the vital "glue" between buildings and play a crucial role in strengthening communities.

In the last decade of the 20th century, it has become increasingly apparent that driving must be reduced to minimize pollution, save energy and rejuvenate community life. Busy streets divide neighborhoods. Cars isolate one person from another. People who live on streets with heavy traffic are less likely to know their neighbors. One effective approach is to close the street off to through-traffic. Once a street has been closed in this way, it has been found in many places that neighbors feel a sense of ownership and often begin to improve the area as an extension of their household space. Parents feel more comfortable releasing children for play, and relationships between households are more likely to develop. Making streets narrower simply calm the traffic. Integrating narrow streets with pedestrian paths and bikeways promotes the forgotten activity of walking. As people walk, they meet their neighbors and friends; the neighborhood comes alive. Dedicating less land to cars means that more is available for people, parks and green-belts (OKTAY, 2001, p. 21).

Flexible design

Flexible design provides ease of expansion and reconfiguration when needed. Design in flexibility has to be considered, to accommodate future needs through the use of modular planning and flexible building infrastructures. The use of fixed cabling and chases that are embedded into the building structure can be difficult and costly to change (MENDLER and ODELL, 2000, p. 8).

Buildings should be adaptable as well. A building should not just be a static object designed for one season – it should be a compromise between all seasons, so the skin design of a building is very important. It would have to regulate energy flow through itself and store any excess energy that it does not need immediately (McCARTHY and BATTLE, 1998, p. 60).

Green spaces

The biggest challenge in today's contemporary human settlement developments seems to be the quantity, nature and location of green spaces within built environments. However, "quality" has been put up against "quantity," and green spaces have been associated more with quantity and less with quality. Green spaces in a city contribute to human activity, climate amelioration and ecological diversity, without separating or isolating people from each other.

Plants may enhance housing environments through protecting water quality, reducing soil erosion, improving air quality, lowering summer air temperatures, conserving natural resources and screening busy streets. However, for proper land design, the location of the plants, their species, year-round effect, shade effect, and windbreak effect should be considered. Besides, the used plant material should be adapted to the region's climate, soils, and water availability to ensure survival while reducing maintenance and irrigation requirements (MENDLER and ODELL, 2000, p. 11).

Green spaces and built forms can modify microclimates on both greater and lesser scales. Plantings can be used to control microclimates in three ways:

- the first is by absorbing and reflecting solar radiation, creating cool shades beneath, reducing ambient summer temperatures and allowing radiation to pass through in the winter;
- the second is by creating a zone of calm air under the canopy; and,
- the third is the cooling function that trees provide by the release of cooling water vapor from their leaf surfaces through evaporation and transpiration.

Trees also provide valuable shelter where the wind is a problem around high buildings. By improving the quality of life outdoors, people will be less tempted to be inside, where they usually consume energy in one form or another (e.g. lights, television, etc.).

Trees should be considered as necessary parts of housing environments, just like streets, electricity cables, water and sewer facilities. Street trees, for example, are important not only because they absorb noise and air pollution, lower utility costs, and provide a habitat for birds and other wildlife, but also because the street and its frontages are a community's major public area. Trees create outdoor spaces that attract people. When people are drawn to spaces with trees, they are more likely to see and interact with their neighbors, and so they are more likely to get to know each other and become friends. Further, a natural environment with a range of vegetation offers children the best opportunities for free play (OKTAY, 1998, pp. 283-284).

Natural and landscaped open spaces are for the use, benefit and enjoyment of the entire community. When deliberately designed for safety, comfort and beauty, neighborhood squares, parks, playgrounds and green acres become places of community activity, as well as neighborhood identity (VLAVIANOS-ARVANITIS, 2002, p. 47).

Natural environment

The idea of nature, as it often appears in common consciousness, is that it is a vast resource subject to human exploitation, that it offers a great wealth of possibilities for the satisfaction of human needs and desires so long as one is able to master it by means of technology. Nevertheless, humans cannot dominate and control nature according to their will. This is clear once one has been informed about the ecological hazards of the 20th and 21st centuries. Even periodically occurring natural disasters, hurricanes, floods etc. that destroy human settlements and kill thousands of people every year, have not been sufficiently instructive to make people realize the limits of this challenge of nature.

New developments in science indicate that we are on the threshold of a new understanding of nature. The uncreative world machine has turned into a creative, evolutionary cosmos. From this view, nature emerges as alive rather than inanimate and machine-like and, as a consequence of this, our survival may depend on our recognition that we are part of nature, not separate from it (FARMER, 1999, p. 205).

Alienation in modern society's experience of nature and the immediate environment is so great that the nearer humans are to nature, the further they are removed from it: the more we approach nature with an exploitative attitude, the less chance we have to ever get into a genuine dialogue with it. Alienation from nature, a typical feature of modem civilization, is a consequence of enlightenment: the development of reflective consciousness brings about a critical distance between humans and the outside world.

The history of modernism that dominates the world today has been developed decisively upon a model of nature as something existing outside and independent of the human being. Throughout history, the continuing character of the principle of "domination" persists in the instrumental rationality of positivist science and modern technology. The previous fear of dangerous, unknown, overpowering nature has now been overcome by the principle of control. In architecture, any act of building on the earth becomes a symbol of human triumph over nature.

However, technology cannot be ignored or rejected as it contributes to human well-being. From the earliest moments of human history, homo sapiens has used technology to exploit natural resources. Neolithic farmers slashed and burned their way through the vast forests of Europe as they cleared the land to work with their digging sticks and stone tools. On the other hand, traditional farming communities that grew from these primitive origins necessarily had to develop a symbiotic relationship with the earth. Today, technology in itself is not to blame for the environmental crisis; it is rather the worldview that sees the earth as a mere stockpile of resources. This worldview must change and with it, peoples' attitudes to technology (FARMER, 1999, p. 207).

Dialogical rationality, on the other hand, conceives of humans and nature in their own right. The concept of dialogue presupposes the conditions of a peaceful interaction between participating subjects. A peaceful, open dialogue with nature that aims to understand its intrinsic qualities is also a pre-condition for making peace with man's inner nature. Although the human being, by virtue of its reflective capacities, holds a superior position among other beings, it is still dependent on nature for survival. If nature has granted humans the capability to create their own world, this should make them responsible for what they have created (ÖĞÜT, 2000, pp. 37-54).

Conclusion

The impending millennium has put housing back into the foreground of architectural projects. Although "intelligent buildings" have been anticipated for some 20 years, the prohibitive costs of many of the technologies involved have limited their realization. The possibilities of technology could transform buildings into automatic, self-regulating systems which could produce a subtly changing and modifying environment, at apparently little energy cost. However, sustainable design is more than a technological add-on. The social, political and economic structures which underlie the making of buildings will have to be reformed to enable designers to use their skills to provide naturally sound environments in the broadest sense.

The practical, ecologically aware experiments made by building single or small groups of housing, usually in suburbs, or the countryside, are important both for their role as prototypes and for their demonstration of the possibility of sustainable living. Care will be needed to ensure they do not experience the same problems as Biosphere, the experimental re-creation of a microcosm of the earth's ecosystem, which apparently foundered at the human, social level rather than the technical level (FARMER, 1999, p. 218).

For sustainable housing design, the factors of durability, maintenance needs and embodied energy costs (including those needed to transport materials or components to the site and to assemble them) have to be re-evaluated. Studies can be done as to the effects of resource extraction and depletion on the natural habitat and which materials degrade biologically. Assessment can be made of the energy required for further processing, if materials can be recycled. The model for sustainable design is nature itself. Nature is efficient and effective by design, essentially producing no waste. Sustainable housing design guides an openness and attention to fitting materials, fitting forms and fitting systems, so that human habitation supports the life of a locale. Combining the local knowledge with an understanding of sustainable materials and energy systems, architects can create buildings that encourage healthy interaction with the natural environment.

The larger political questions of how urbanization can be equated with sustainable ways of living, have scarcely begun. Architecture can express, like any other language, the priorities of the day, and it can make tentative prototypes and perhaps dream of solutions. It may be that the environmental crisis will best be confronted by application in architecture.

Cities have to be able to effectively treat waste products, and generate energy, as well as consume it. In order to achieve this goal, architects, designers and engineers need to embrace a combination of new technology and inherited architectural vernacular. Some construction methods – including on-site welding, transportation of materials, and the use of raw and uncut materials – contaminate the building site with pollution, waste and noise. The environmental impact of building construction has to be limited. One of the most obvious solutions is to reuse buildings that already exist. But if that is not possible, architects can use materials that require little energy to produce and ship, and are renewable, modular (to reduce construction waste), and prefabricated (so construction can be done in factories and not on city streets).

Architecture and urban planning based on environmental preservation are the only options for maintaining quality of life and preventing lasting environmental damage. Pollution reduction, waste minimization and energy conservation can be furthered through environmentally friendly urban design and construction. The environmental community has promoted the slogans of reduce, recycle, and reuse. Recently a fourth has been suggested: Recover. The remediation of environmental pollution and damaged natural resources is vital to the support of future sustainable development. So, a new kind of architecture has to be created that actively promotes such development.

As a broadly interpreted concept, sustainability is becoming more and more difficult to realize under the impact of worldwide globalization. Nevertheless, globalization offers opportunities and challenges for sustainable development.

Bibliography

ADAMS, W.M. (2001), *Green Development, Environment and Sustainability in the Third World* (London, Routledge).

ATAKARA, C. and A. TANRIKUL (2004), "Sustainable developments for coastal problems in Kyrenia, Cyprus," *International Gazimagusa Symposium 2004* (Gazimagusa, Eastern Mediterranean University Press).

BRAUNGART, Michael (2003), "Beyond the limits of sustainable architecture: A new material sensibility for the twenty-first century," in David Gissen (ed.), *Big and Green Toward Sustainable Architecture in the 21st Century* (New York, Princeton Architectural Press).

CROWTHER, Richard (1992), *Ecologic Architecture* (Boston, Butterworth-Heinemann).
FARMER, John (1999), *Green Shift*, ed. by Kenneth Richardson (Boston, Architectural Press).
GISSEN, David (2003), "Energy," in David Gissen (ed.), *op. cit.*
GUNTHER, Thomas, Schmitz (1999), *Living Spaces Ecological Building and Design* (Köln, Könemann).
KUBAN, Dogan (1996), "Scraps of philosophy for human dwelling," in Yıldız Sey (ed.), *Housing and Settlement in Anatolia: A Historical Perspective* (Istanbul, History Foundation Publications).
LEITMANN, Josef (1999), *Sustaining Cities* (New York, McGraw-Hill).
McCARTHY, C., and G. BATTLE (1998), "The need and drive for sustainable architecture and urban design," in Andrew Scott (ed.), *Dimensions of Sustainability* (London, Routledge).
MEGA, Voula (1999), "Environmental, demographic and territorial dimensions of sustainable development," *Ekistics,* vol. 66, no. 394/395/396 (Jan./Feb.-Mar./Apr.-May/June).
MENDLER, S. and W. ODELL (2000), *The HOK Guidebook to Sustainable Design* (New York, Wiley).
NORBERG-SCHULZ, Christian (1985), *The Concept of Dwelling* (New York, Rizolli International).
OKTAY, Derya (1998), "Green spaces and the ecological quality of housing: The case of Cypriot settlements," *Ekistics,* vol. 65, no. 391/392/393 (July/Aug.-Sept./Oct.-Nov./Dec.).
—— (2001), *Planning Housing Environments for Sustainability: Evaluations in Cypriot Settlements* (Istanbul, YEM Yayın).
ONAL, Sebnem (1997), *Designing For Sustainable Architecture* (Gazimagusa, EMU Faculty of Architecture Dept. of Arch. Press).
ÖĞÜT, Rana Nergis (2000), "Reflections on the conception of nature within the framework of the dialectic of enlightenment," in A. Sargın Güven (ed.), *Nature As Space* (Ankara, METU Faculty of Architecture Press).
VLAVIANOS-ARVANITIS, Agni (2002), *Bio-Syllabus for European Environmental Education* (Athens, Biopolitics International Organisation).

"The Natural City" Symposion – Sessions on international issues

Fig. 1: Anis ur Rahmaan and Bushra Anis on Pakistan.

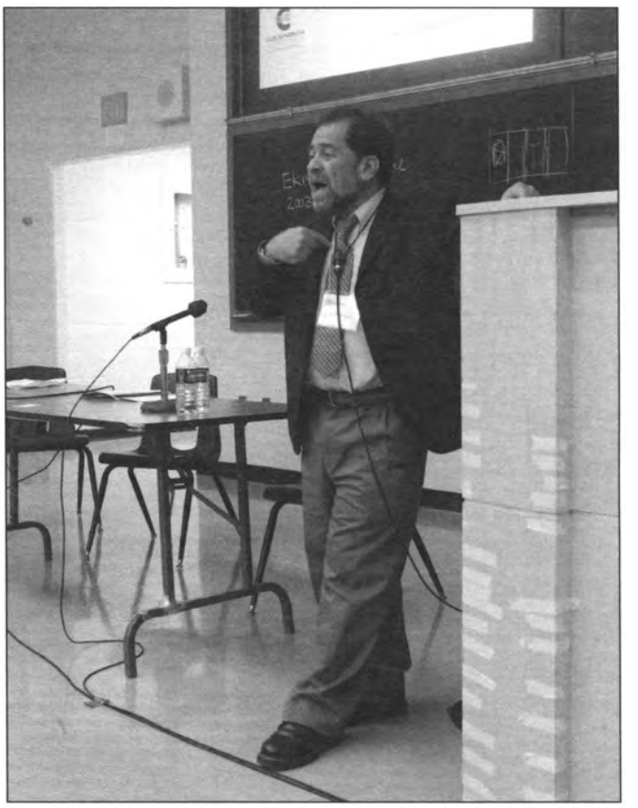


Fig. 2: Bruno Henriquez on Cuba.

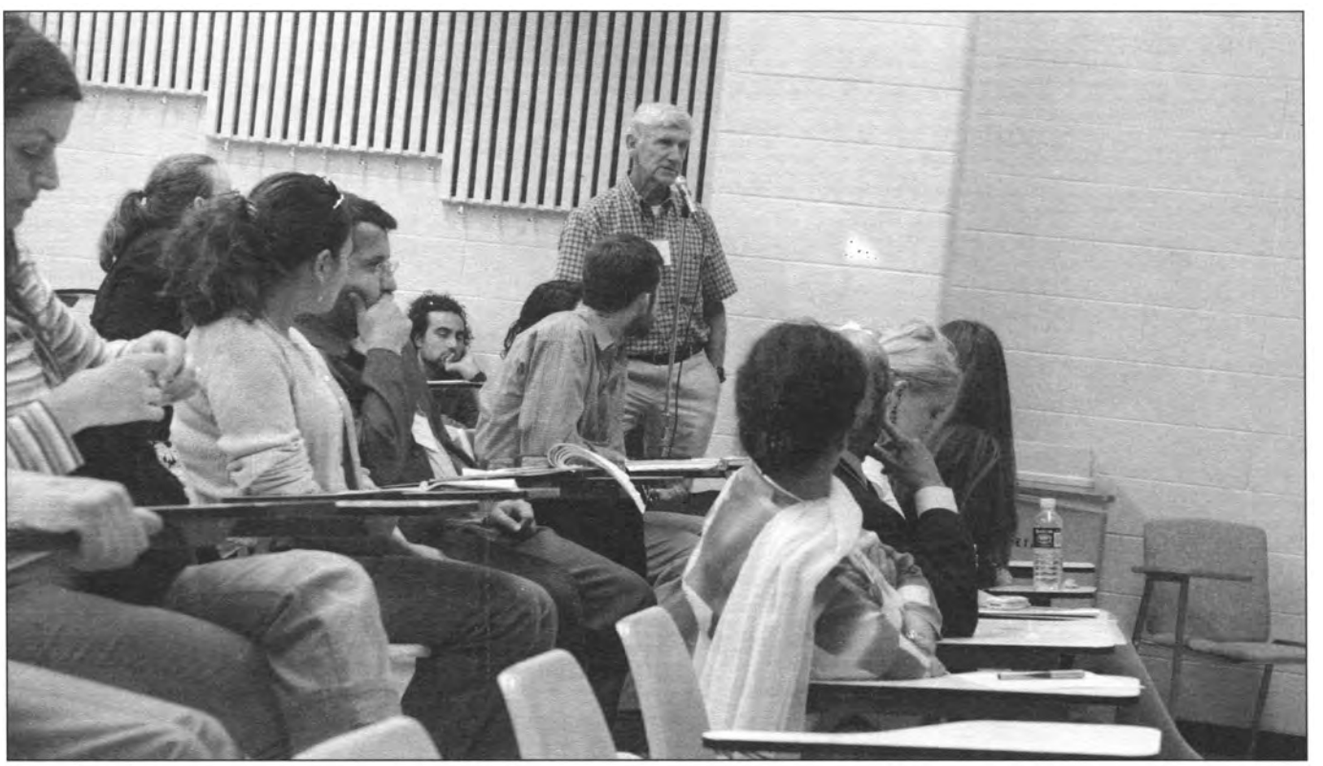


Fig. 3: Spenser W. Havlick (USA) on college and university campuses – Student session.

Planning the emergent Basque megalopolis as a natural multi-metropolitan complex

Lawrence D. Mann

The author is Professor Emeritus of Planning, Regional Development and Public Policy at the University of Arizona, Tucson, Arizona, USA and Biarritz, France. He was formerly Professor and Chairman of the Department of City and Regional Planning at Harvard and before that held a similar position at Rutgers University. He has been a visiting professor at five different Latin American universities. He was for ten years the Review Editor of the Journal of the American Institute of Planners *and was the initial compiling editor of* Ekistics *magazine. Professor Mann was national Chairman of the American Institute of Certified Planners, and was elected Fellow of the Institute in 2003. His research into Basque Planning has involved several months of field-work in the Basque region every year since 1999. The paper that follows is based on a presentation that he gave at the international symposion on "The Natural City," Toronto, 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics.*

Introduction

The paper[1] is introduced, first by some basic ideas of planning applied to Basque prehistory, history and present, dealing with, secondarily, the question of whether or not Basque planning is substantially unique. The third part of the introduction deals with the nature of "natural cities," leading to the idea of an urban natural-artificial trade-off matrix.

The main body of the paper deals, first, with the existing Basque spatial structure, consisting of seven metropolitan areas growing together, toward a megalopolis that could well have specified negative outcomes. Second, it examines recent and current efforts to control or guide such development. After reviewing the limited efforts of the "Eurocity Basque" and those at the intermediate level in France and the Spanish Navarra province, the paper turns to the impressive work of the Department of Territorial Planning and Environment of the Basque Autonomous Community in Spain. Separately, "Plan Ibarretxe," a metaplan for future Basque national and international negotiation and planning is described. Its recent passage by the Basque Parliament and impact on a subsequent Basque parliamentary election are evaluated – as well as the prospects for it being submitted to a non-binding Basque area referendum in the successful territorial planning there. But it is concluded that "Plan Ibarretxe" and other promising developments hold out some hope for a desirable outcome from such efforts as the development of a planned natural, multi-metropolitan complex for the region.

Basic Ideas of planning, applied to the Basque context

Environmental planning, in the broadest sense, may be seen as that human activity of ***thinking about doing,*** in which ***modification of some major part of the physical environment*** to accomplish some purpose is ***part of the thinking,*** and also ***the subject of an important part of the resulting intended action.*** This phenomenon has probably existed from the time of the appearance of true humans (Cro-Magnons, in Europe) on earth, at first evidently concentrated on environmental modification to entrap big game.[2]

The Basque people of the Basque Country, or *Euskadi,*[3] of Southwest Europe are the descendants of the original Cro-Magnons, if we are to accept the logic of current international linguistic scholarship.[4] Their planning began when true-human environmental planning began, more than 40,000 years ago. Their strategic planning no doubt soon became applied to warfare, though the archaeological evidence is scant. Their spatial or territorial planning is evident in the arrangement of the painted caves more than 30,000 years ago.[5] Later, sedentary herdsman and farming developed early in Basque culture, with strong environmental planning implications, and it is evident in Basque planning today.[6] By the time of the Roman Conquest in 56 BC, the military strategic planning, of several kinds, of the Basques was clearly in evidence. Julius Caesar's account of the Battle of Sos makes that quite clear. Strategy, however, remains clearly central to contemporary Basque culture. It is most visible in games such as the famous Basque card game, ***mus*** and in sports such as ***Pelote Basque [Euskal Pilotaren Gogoa]*** (called ***hai-alai*** in the Americas).[7] To see that environment is central to much of contemporary Basque thought: one has only to consider the ***etxe,*** the house – one of the glories of Basque culture – and its extension up or urban settlements and up to regional or national territories.[8]

"Irreducible Basque Phenomenon" applied to planning?

Basque environmental planning today should not be expected to be substantially unique. After all, more then two millennia of acculturation – from the Gauls, the Romans, the Catalans, the Bearnese, and the Castillians – have taken place. The most direct borrowing has been in the past four hundred years, from the French and from the Castillian Spanish. This borrowing is clear in that there is no general concept of planning in *Euskera*, other than the loan word from other European languages. The word for territorial or regional planning is

antolamendu, connoting "arrangement" just as it does in the French *aménagement* or the Spanish *ordenamiento.* If there is uniqueness in Basque planning, it will be found below the surface. Philipe Oyamburu, in his widely read book of that title, has argued that such fundamental differences do indeed exist, and that they have to do with a stubbornness, a near obsessive economic calculus, an adventuresome optimism, and a pragmatism. Later research may or may not verify the saliency of some of these traits among contemporary Basque planners.[9]

More recently, one of the leading Basque social scientists has advanced the viewpoint that Basque uniqueness is relative, not absolute.[10] Pierre Bidart has reviewed the writing about "the specificity" of the Basque people, starting with the German writers of the 18th century. He then examines the 19th century posits of priest-anthropologist J.M. Barandiaran, and the French writer, Jon Mirande, among others. Finally, Bidart examines the scientific approaches of the 19th and 20th centuries to the Basque question. Bidart's is a post-modern formulation – a discourse upon other discourses – and, by its nature, arrives at few specific conclusions. Rather, Bidart achieves something of a post-modern compendium of discourses about "Basqueness," virtually all of which he finds too wanting to justify any positive conclusions: Thus the conclusion about the relativity of Basque uniqueness.

Neither Oyemburu nor Bidart has a ready explanation of the supposed universality of these traits of the residual Basque culture today, but there may be one. That would be the Basque language, the only cultural trait that has remained relatively intact over the centuries. Euskara does have a number of features that make it quite unique in Europe, and indeed worldwide. It is a reflexive language and some of its verbs are quite mathematical in their logic. However, no serious argument has been advanced so far to the effect that planners who think in Euskara, arrive at substantially different proposals, thorough different mental processes, than do the native speakers of other languages. Future research may yet yield evidence of the effect of Basque semantics on planning thought and action, however. (Bidart seems to reject this possibility, but, consistently, he is ambivalent.) The one hypothesis I do have about the possible singular uniqueness of Basque planners is that they have a strong tendency to think concretely about specific places – to the point that they frequently refuse to discuss a place unless they know that the person they are talking to has actually been there. I am not familiar with such a strong tendency toward empirical specificity in any other of the numerous nations where I have had occasion to discuss planning.

The nature of "natural cities"

The "natural cities" literature emphasizes water and some biological species of some macroscopic flora and some vertebrate fauna. Arguably, the first full-fledged theory of the "natural" city came from Frederick Law Olmsted in 1869, when he recognized that the city was essentially *artificial* in nature but that the infusion of major natural elements would be to the great benefit of its residents.[11] Olmsted made it clear that he understood that the human city was essentially an artefact of the built environment in pursuit of economic, political and social objectives. But he argued strongly that none of these objectives would be much harmed, and *some of them* would *sometimes* be advantaged, by the systematic infusion of elements more characteristic of rural, even sylvan environments. Implicit in his writing, in my view, was the germ of a "trade-off" function, whereby there is a gain in social and economic goals by adding "nature" to cities – at least up to some "saddle-point" at which the advantages become negligible and after which there would be a decline in social and economic functioning with each new addition of more "nature."[12] I shall refer to this idea below.

Olmsted's formulation was followed decades later by movements in favor of more urban parks and "garden cities," movements that fed the creation of both landscape architecture and urban planning. By the late 1950s, Olmsted's implicit socio-economic/natural trade-off idea had been largely abandoned by landscape architects. The revised formulation most overtly appeared in the assertion that one could increase urban parks and other "natural" features *infinitely and always* have the land costs (or even the land costs plus the improvement costs of the recreational open space) paid for by increased taxes due to increases in land values around the new "natural" facility.[13] After 1965, Ian McHarg's version of ecology arose as the main quasi-scientific rationale for maximizing water and selected biological species in cities.[14] McHarg's work, seemingly "scienticized" that implicit slogan of the urban landscape architects, to the effect that one could infinitely increase the amount of "natural" open space in any city with a corresponding increase in land values and, thus implicitly, human benefit. And this fallacy is probably at the heart of much error in the "natural city" literature today.

Spatial structure of the Basque region

In some of my earlier discussions of this subject, I have used a historical method to show how the Basque region's spatial structure has evolved. But, for present purposes, it is probably better to note that the spatial structure is now clearly dominated by a number of metropolitan areas, as many as seven if the boundaries are relaxed to include closely related metro areas.[15] At one or more lower levels are the second order cities and towns, mostly market centers but some with substantial manufacturing as well. And then there are the small town and village centers that link agricultural and extraction areas with the urban system. So the true megalopolitan area of expansion is centered in the metropolitan areas, which are growing toward each other, and two orders of smaller cities and villages

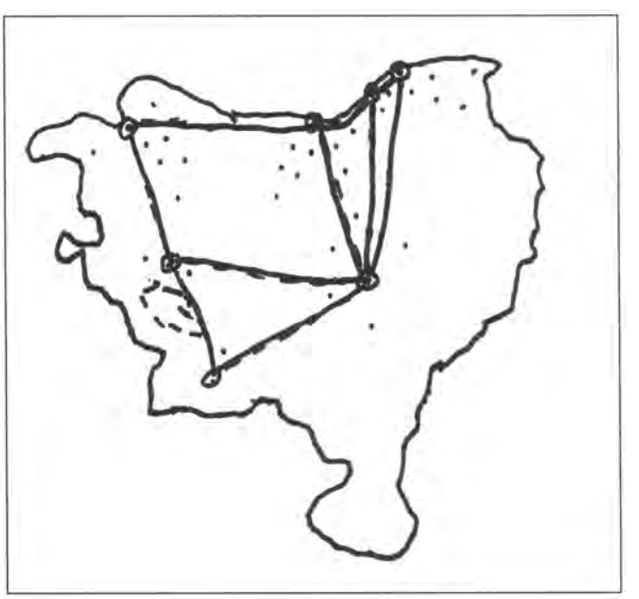


Fig. 1: Abstract of spatial structure, Basque-speaking region.

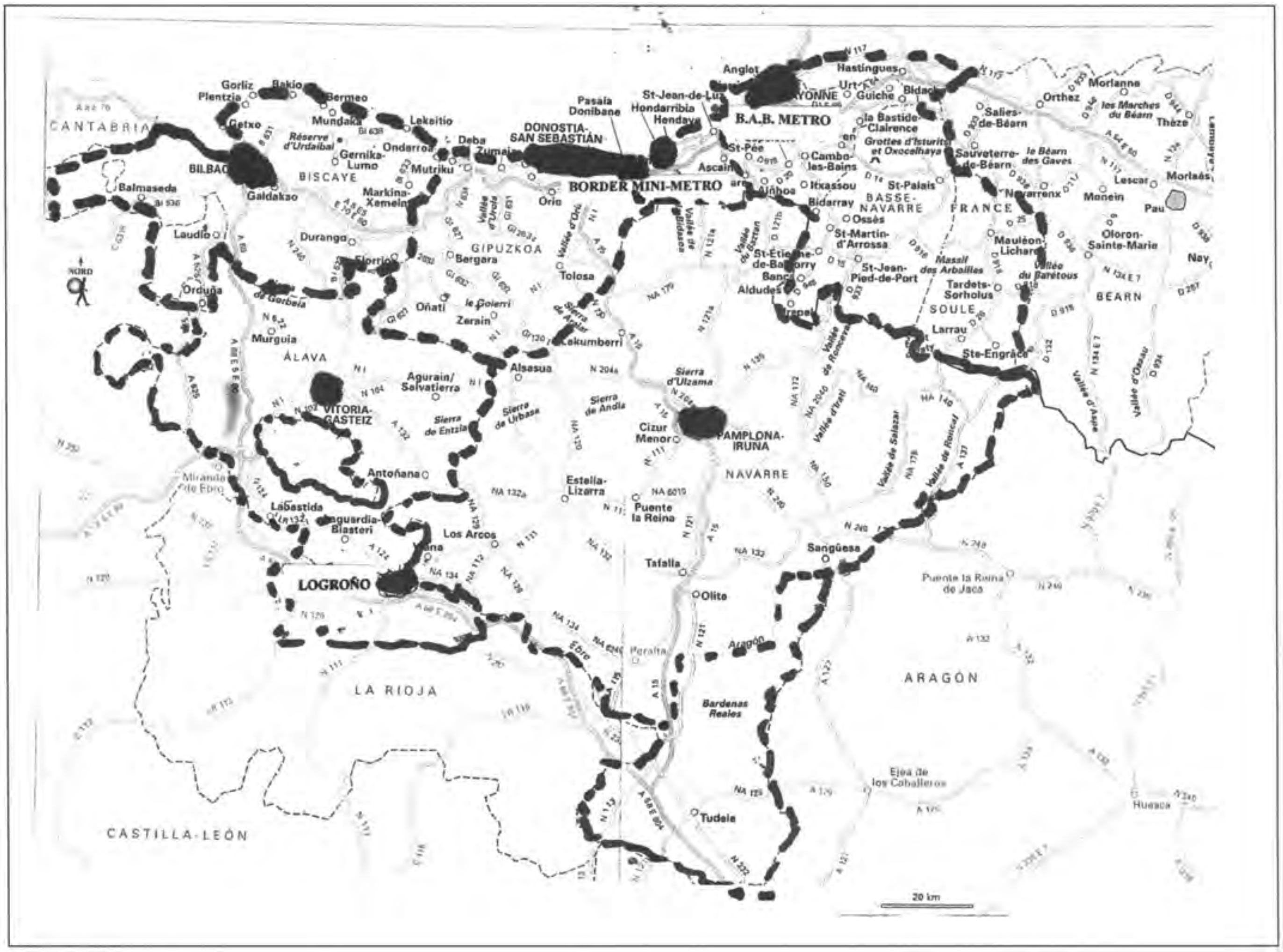


Fig. 2: Seven-metro implicit Basque spatial structure.

of the Basque-speaking region itself. These metropolitan areas are as follows (fig. 1), clockwise from the North:

- The B.A.B. Metro Area of France (Baiona/Bayonne, Argelu/ Anglet, Miarritze/Biarritz complex);
- Iruña/Pampalona Metro Area of Nafarroa/Navarra, Spain;
- Longroño Metro Area, of Rioja, Spain;
- Gasteiz/Vitoria Metro Area of Araba/Alava, Spain;
- Bilbo/Bilbao Metro Area of Biskaia/Biscaya, Spain;
- Donostia (San Sebastian) Metro Area of Gipuzkoa/ Gipúscoa; and,
- Irun-Fontarrabie-Hendaia (Irun-Hondarrabia-Hendaye) border mini-metropolis.

Contemporary Basque spatial structure

Basque spatial structure[16] can easily be summarized in the abstract. Think of an irregular heptagon, with the seven main metropolitan areas, above, at the angles. The sides are thus imaginary external connecting lines between the above-listed metro areas. Internal lines to this heptagon may also be shown. The metro areas or large cities at the angles of the heptagon are, except for Gasteiz-Vitoria, surrounded by more or less well articulated rings of suburbs and related to more or less well-developed hierarchical hinterlands of smaller cities, towns and villages. Each of these large center cities has about two hundred thousand residents – except for Bilbo (Bilbao), which has nearly three times that number. Hendaye-Irun and Longroño each have about half that number. The seven metro nodes are interconnected by good highways and railways, including limited access turnpike-autoroutes on the BAB-Bilbo(Bilbao) axes and the Donostia(San Sebastian) axis to Gasteiz-Vitoria. There are plenty of agricultural and other open spaces in the interstices between the extemal and internal axes. The region is well-endowed with wildemess areas and agricultural and grazing lands (fig. 2).

"Trend" spatial structure

The future spatial structure of Basque Country, if left to market and other spontaneous forces, is hardly a mystery. Since Gottmann's posit of the Northeast U.S. megalopolis, virtually scores of such metropolitan-areas-growing-together have been identified, documented, and analyzed. There is no reason to suppose the spontaneous-trend Basque megalopolis would be substantially different. The economic forces for waves of tourist and retiree locations is well established on both sides of the Pyrenees, and the accompanying destruction of the natural environment is already too clear to be ignored. Current French and Spanish governmental measures to restrain and direct such growth do not promise much hope that the spontaneous trend would be substantially altered. The critical test case of current planning measures is probably the strip some 50 km deep along the Atlantic coast – from the B.A.B. industrial suburbs of Boucau and Tamos in the North to

the beach and resort area just West and South of Donostia (San Sebastian). That area has already almost entirely yielded, or is in the process of yielding, to the megalopolitan form or urbanization. The tools for effective growth control are simply not in place, or even in view. In time, we must forecast, several metropolitan areas would indeed grow together, with huge, suburban "edge" urbanizations of indifferent quality taking the place of many currently attractive natural areas, which are also the refuge of traditional cultures.

Promotional efforts to modify the trend: The "Eurocity Basque" initiative

In 1993, the then Metro District of Biona (Bayonne)/Angelu (Anglet)/Biarritz (Biarritz) (in France) and officials in the Donostia (San Sebastian) centered Gipuzkoa (Gipúscoa) province, (in Spain) began brainstorming about the idea of the areas. The discussions were from a background of cooperative work between the two ports, Baionna (Bayonne) and Donostia (San Sebastian), and they were inspired by the outlook of linear megalopolis that was forming along the coast of the European Community.

The specific impetus was the quasi-academic discussion of the "Eurocity" phenomenon of cities across the now relaxed, international borders. One branch of the identified "Eurocity" was the "Atlantic arc," from about Bordeaux to about Bilbo (Bilbao). The "Eurocity Basque" was to be just the border portion from Baiona (Bayonne) to Donostia (San Sebastian) about 50 km deep, of this larger urban, multi-nodal structure. The logic behind selection of just this area was never made entirely clear. However, the initiative did receive some encouragement from authorities in both France and Spain in the early years. Most impressive was the naming of this idea as a "pilot project" by the French Inter-Ministerial Delegation for Regional Planning (D.A.T.A.R.). There was also an expression of support from the General Council of the Atlantic Pyrenees *département.* (No parallel encouragement was offered by the Spanish central Government, however, and support from the Basque government also appears to have been muted.)

The initiative was promoted to the area's municipalities in a number of forums and workshops. There followed several years of staff work, with personnel provided by the local and (in Spain) provincial governments. A "white book" was produced, a multi-lingual web site developed (www.eurociudad.com), and an international agency of sorts was established. The key years of activity were between 1998 and 2000. A fairly ambitious agenda of activities was produced for each of the years through 2004.

A recent scholarly examination of the idea, by Gabriel Sansinenea, a Spanish Basque geographer, has been published.[17] His account of activities ends in mid-2001. However, Sansinenea made it clear why no sustained regional and metropolitan planning could be expected from this venture. He says:

". . .this trans-border project does not lack creativity or good intentions; but, for now, it involves only a document lacking in judicial value, that has to be implemented. And what is more important, it has to become socially integrated. For that we count on the European context, which is supporting the idea in many respects. But this will never be enough unless we can count on social understanding in both the public and private sectors."[18]

There is a rather naïve quality to both the "White Book's" discussion of government and even to Sansinenea's own conclusions. The major defects of the "Eurocity Basque" promotion were that the selected area was probably not the right one to fit the logic of the "Eurocity" discourse; there would have had to be established an international public or ("mixed economy") agency. The "White Book" should have built these considerations into what the present planning agencies, or some modification of them, could do; and there should have been less attention to promotional devices and more to serious strategy.

Existing metro-megalopolitan planning in the Basque country

Planning in both Spain and France has rather smoothly evolved toward the common approaches to urban and regional planning that have been advanced by the European Community. In that approach, it is assumed that all countries will have national economic, social, environmentally protective and culturally protective plans. They will also have regional plans that are, as Sansinenea puts it, "the spatial expression of economic, social and ecological policy."[19] Regional spatial plans stand higher than urban planning, conceived of as limited to municipal in scope; regional planning is seen to be applied to metropolitan and larger areas – up to the nation, or even Europe as a whole. The content of regional spatial planning is "basic for a coordination of existing public administrations, trying to obtain balanced development of regions, of their income, their urban design, etc."

The objectives of such regional spatial planning in the European context are:

- Develop a balanced, polycentric urban system that strengthens association with rural areas;
- Reinforce the polycentric development of the territory with integrated systems of transportation and communication, assuring accessibility;
- Develop and conserve the cultural and natural heritage of the territory.

Contemporary governmental efforts

- **United Planning Agency for the Atlantic Pyrenees *Département:*** On the French side of the Basque Region, there is one agency that potentially *could* plan for the entire three traditional Basque provinces. That is the Urban Planning Agency for the Atlantic Pyrenees *Département.*[20] This agency was created only a few years ago at the behest of *Département* Council, and it has proved to be an invaluable source of economic, demographic, and mapping studies as well as local plans. (It has done major work for the BAB metropolitan area.) This is despite its chronically understaffed situation. It currently has a multi-disciplinary team of three architects, three geographers, one economist, a documentation specialist, a land surveyor/computer specialist and two secretaries.

The agency functions as a kind of public consulting firm, responding to requests from its own *Departmental* elected councillors and to local government elected officials to do whatever research for planning or planning that may be desired. The current workload includes maintaining a "Territorial Dynamics Observatory" consisting of atlases, a rental observatory, a diagnostic study of businesses, socio-economic analyses of residential migration, and of specific localities. A second area of work is called "the territorial fabric" including studies such as an approach to public schools for the *Département*, and specific small town and village studies. The third area of the workload is Planning per se, which include "the territorial dynamic" (studies of the "urban footprint," transportation times, population densities, and community facilities.) Included in this category too are the studies of the Adour/South Landes urban forms and activity zones, residential mobility, and local urban plans and related studies. A fourth area of the agency's workload is called "decision-aids and mastery of works." These are interpretative exercises to sharpen the results of quantitative studies into findings that elected officials can use in deciding what

to do.

Included are materials on the interior Pays Basque, sports practices in schools, transportation infrastructure (for the BAB metropolitan area), and some local exercises. Finally, the workload includes several miscellaneous local projects. It is an impressive agenda for an agency of this size and maturity. It would be premature to suggest than a planning agency of this character and orientation would be appropriate to future joint regional planning with planners from the Basque Autonomous Community. More than half of the workload of the Atlantic Pyrenees agency is dedicated to projects outside the Pays Basque, for the *Département* also includes the entire Bearn cultural region, with its larger and more dynamic Pau metropolitan area. Moreover, its mission has been stretched to deal with all of the areas of the Adour River basin – that is, all of the southern Landes *Département*. So probably less than one third of the agency's workload can be expected to be concentrated on the Basque area. Moreover, even those projects that do concentrate on this part of the *Département* seem to be quite insensitive to Basque culture, including language. There seems to have been no effort to assure that Basque-speakers are included among the key agency personnel, and apparently only French language place names are used in their work – even in Basque-speaking communities they have studied. (This may well be a legal requirement since the agency is really a unit of French national government, simply allocated to this *Département*). Finally, it seemed for a time that this agency might be moved to another level to be consistent with the large-regional emphasis of the then newly elected French government of Pierre Rafferin. That priority changed, but in the future it is clear that a change in French national policy could at any time have these research and planning functions transferred to Mont-de-Marsan or Bordeaux, to the regional government of the Aquitaine Region.

Research on this agency is not yet complete. It is already clear, however, that the attitude of most planning agencies in France pretends that the Basques do not exist. Beyond that, it is essentially planning following the guidelines set down by the French national government, with relatively minor additions and changes specifically for this *département*. Unless or until that fundamental attitude changes, coordination of regional planning with other parts of the Basque-speaking region can be expected to be minimal.

There are planning agencies in each of the larger municipalities, but none of them, of course, is capable of leading area-wide planning of the kind that is likely to be required. This has become clear with the "Eurocity Basque" project that was launched with great fanfare about five years ago as a joint venture of the City of Biaona (Bayonne) and the provincial govemment of Gipuzkoa (Gipúscoa), complete with and expensive and, initially, well-maintained web-site.

- **The B.A.B. Metro Planning Agency:** The second agency to be discussed is the BAB metropolitan planning agency, staffed by professionals provided by the three constituent cities. This agency did not have enough personnel to carry out the key transportation planning study, and had to turn to the *Departmental* agency for that important task. In time, the BAB planning agency should be able to do all of its own work. However, it does not deal with a wide enough scope to be able to work effectively with the agency or agencies from across the Pyrenees for megalopolitan planning.[21]

- **Planning agency for the Spanish Nafarroa (Navarra) province/autonomous community:** Research on this agency, parallel to that of the French agency for the Pyrenées Atlantiques, for the entire province (now Foral Autonomous Community) of Nafarroa (Navarra), is not yet complete. It is already clear, however, that the attitude of all public agencies in Nafarroa/Navarra assumes that the Basques do not exist. Beyond that, it is essentially following the guidelines set down by the Spanish national government, with relatively minor additions and changes specifically for this province/autonomous community. Unless or until that fundamental attitude were to change, coordination of regional planning with other parts of the Basque-speaking region would quite unthinkable.[22]

- **Territorial planning in the Basque Autonomous Community[23]:** The Basque Autonomous Community, in Spain, was created as a result of the Socialist government's decision to have a new Constitution for the democracy that appeared after Franco's demise. That Constitution (1978) provided limited autonomy for the Basque region (as well as for Catalonia, Galicia, as well as for several other provinces.)[24] The entity created to receive that limited autonomy was the Basque Autonomous Community. It was given as territory the provinces of Biscaya (Biscaya), Gipuzkoa (Gipúscoa), and Araba (Alava), but it excluded Nafarroa (Navarra/Navarre), the historic center in much of Basque history. And, as a Spanish creation, it of course excluded the historic three Basque provinces in France. Despite its territorial limitations, the creation of the Autonomous Basque Community marked the first time that anything resembling autonomous decision making by Basques for even part of their homeland existed in more than 2,000 years.

  Powers given to the Basque Autonomous Party were apparently numerous but in reality quite limited – especially whenever a hostile Spanish central government (such as the recent Popular Party one) was in power. A Basque Parliament was created, but it was restricted by the power of the Spanish Parliament and by the Spanish national courts. A localized judiciary was created, but clearly subject to the Spanish national judiciary. A Basque executive branch was created, centering on a Basque president (*Lehendakari*), and there was a vice president. Executive functions, some ten or eleven in number, were concentrated in an array of ministerial-level departments. However, which parts of what functions were retained by the Spanish central government was not always very clear and often had to be negotiated or decided upon by Spanish higher courts. Even the budget was allowed to become often the subject of bitter annual negotiations.

  One of the executive clusters of functions was named "territorial planning, housing, and the environment." (In recent years, "housing and social affairs" has been moved to a separate department, but the agencies overlap in practice). The Basque name for the first part of the remaining department is *Lurralde Antoalmendu,* which translates directly into Spanish as *Ordenamiento del Territorio* (from the French, *aménagement du territoire),* and is best expressed in English as "territorial planning" with a connotation of "arrangement" in all languages.[25] The second half of the cluster of functions is straightforward: *Ingurugiro (medio ambiente), Environment.* This part of the department is defined rather comprehensively and compares rather well with the scope of such national agencies internationally. It covers biodiversity and ecology, water and the coastline, land, air and noise, environmental impact analysis, contaminated sites, waste disposal, and the Basque register of emissions and pollution sources. It has its own thematic cartography division. There is a special section for the Uraibai Biosphere Reserve (a huge area on the coastline between Bilbo (Bilbao) and Donostia (San Sebastian)), as well as its own proactive public environmental management company ("Ihobe"). The fusion of "territorial planning" with "environment" into a single executive agency suggests that the Basque Autonomous Community has the beginnings of an appropriate way of dealing with both the socio-economic and the natural, in planning the Basque inter-urban natural complex.

  Territorial planning consists of mapping and related ser-

vices, participation in an international "Project Cities," major newer functions in the sectoral regional plan for riverbanks, and a geographic information system as a service to both regional and municipal planning. The riverbank studies and plans include several different aspects, ranging from hydrology to studies of riverfront urban places. The way the Basques have developed their territorial planning activity during the past 15 years proves even more interesting. A specific law for "territorial planning" was developed in 1990. By late 1996, a detailed report was debated in the Basque Parliament, and from it the "Directives of Territorial Planning" (a massive compendium of several hundred pages, profusely illustrated) was published first in 1997.[26] Briefly, the Directives start with a heavy emphasis on the natural environment, its inventory and protection; and then the document turns to "arranging" the region's spatial structure toward the achievement of economic and socio-cultural objectives. A key summary output is the "Regional Model" of the future Basque spatial structure, which promises to become a powerful decision-tool in future years. The work of the department since then has been a deepening of the basic principles and extending the logic into "sectoral territorial plans" (i.e. industrial ruins, land locations for promoting housing, protection of the banks of rivers and streams, and economic activities), and "partial territorial plans," including criteria for planning provincial and municipal planning. This latter has recently led to an inventory of municipal planning for the region, as well as the initiation of an entirely new Basque local planning and urban design law. (But see note 28, below).

Related to its main thrust of developing the "Territorial Planning Directives," with its summary "Territorial Model" has been its multi-year collaboration with the *Fundación Metropoli* in sharpening its focus on the proactive urban development aspects of its effort. (The *Fundación* is a kind of international think-tank for modern urban development in mixed economies). The report of the *Fundación, Euskal Hiria: Proyectu,*[27] was published by the Basque government, though its more proactive recommendations for local economic and social promotion go beyond the scope of the department as defined by law. These policies have never been debated or passed by the Basque Parliament. Nonetheless, the sharpened view of the proposed Basque Polycentric System of Cities does have the advantage of having posed with specificity the implicit spatial structure for the region. Even more importantly, it provides something of a strategy of how to get there, of achieving modernization both for the system as a whole and for individual metropolitan areas, secondary urban centers, and smaller rural-urban foci. These ideas are advanced for future possible decisions, by Basque decision makers, throughout the larger, extended, region.

The "Territorial Model" has as its dominant element the Basque poly-nuclear system of cities, towns and villages, led by the several metropolitan areas of Bilbo (Bilbao), Donostia (San Sebastian), and Gasteiz (Vitoria) [Vitoria-Gasteiz]. The border mini-metropolis of Irun, Hontambia (Fontarabia), Hendaia (Hendaye) needs to be added. Then, outside the Spanish Basque Autonomous Community territory, the historically and functional key Iruña (Pamplona/Pamplune) metropolis in Nafarroa/Navarra, the external but functionally-linked Longroño complex, and the B.A.B. metropolis in France must be added. The next level of centers of important market and industrial centers needs to be elaborated more systematically. And the hardest tasks ahead will be that of doing justice to the quasi-urban bridges to agricultural, grazing and natural areas – the small towns and villages so central to Basque culture. Overall, this "Model," if the smaller centers are successfully fleshed out, has the potential of achieving a heavily *natural* multi-metropolitan and multi-centric complex, perhaps unmatched anywhere else on the globe. In brief, the Basque Autonomous Community has made a good start at the kind of megalopolitan planning that will be required in decades and centuries ahead. It is particularly important that the environmental aspects be well-founded. The neglect of the efficiency facets of settlement structure also needs to be rectified. However, the needed inputs from economics and the social sciences can easily be added later on by any number of inter-ministerial arrangements.

"Plan Ibarretxe": A strategic framework for future planning?

The Achilles' heel of the entire "territorial planning" initiative of the Basque Autonomous Community is that it lacks appropriate jurisdiction for the task at hand. The fundamental problem that the effort addressed, again, is the need to promote, for the entire Basque regional territory, modern economic and social development while avoiding the self-defeating horrors of megalopolitan development – resulting in the permanent degradation of a rich and beautiful, but fragile, natural environment. The problem with the planning effort resides partly in the more-apparent-than-real quality of the Community's autonomy in Spain. However, in addition, the Basque Autonomous Community has jurisdiction, or even hope of meaningful influence, over only a portion of the regional territory. Nafarroa (Navarra/Navarre), the Longroño complex, and the three French provinces were, up to 2001, quite outside any meaningful planning by the Basque Autonomous Community. Indeed, there was official hostility to things Basque (except folklorish tourism), in all of these jurisdictions. The only available vision to deal with such seemingly intransigent problems to date was the vague intention, frequently stated since 1990, for the territorial planning to be a "pioneering effort" that would somehow inspire parallel efforts in the other jurisdictions. History does not display many instances of such vague hopes being automatically realized.

Into this problematic situation there appeared, without much warning, a remarkable potential strategy for Basque national development and inter-jurisdictional dialogue among Basques. This was the highly controversial "Plan Ibarretxe," named after the then and present Basque President (*Lehendakari),* Juan Jose Ibarretxe. This plan-for-planning, or meta-plan, was announced about the time of his presidential inauguration in mid-2001, was passed by the Basque Parliament, and later became elaborated into a full-fledged proposal. "Plan Ibarretxe" has been the subject of heated debate for the past four years and was proposed as a non-binding "consultation" referendum to the entire Basque electorate. A key part of the proposal is for a new political statute for the Basque homeland, stipulating that the Basques have a right to decide their own future, and posing a new model of relationship to Spain – based on the principle of "free association." The new statute would replace that of 24 years ago, with the aim of improving "living together" with Spain, broadening self-government, and improving the well-being of all Basques. The "Plan" has three premises:

- That the Basque people are a European people, with their own history;
- That the Basque people have a right to decide their own future, in conformity with the right of self-government of peoples, as proclaimed by the Basque Parliament and internationally recognized;
- That, in exercising the right to decide their own future, the citizens of the Community of *Euskadi* [the Basque homeland], of Nafarroa (Navarra/Navarre) and the Basque provinces of France, respectively, have the right to be consulted in referendum, and their will should be respected.[28]

It is on these three premises that the Basque people would ask for a new political statute of free association with the Spanish state. That would clearly change the game of autonomy, with the implicit possibility of a future referendum for total separa-

tion from Spain. The third premise would allow for future joint decision making between the Basque Autonomous Community and Basques residing outside the territories. Both are seen as threatening by supporters of the status quo.

The evident end of ETA violence, announced on March 22, 2006, and confirmed many times by events since, will require a more intensive analysis at a later date to fully assess the impact of Plan Ibarretxe – or whatever the consensus document for Basque overall strategy may come to be called. But the probable future impact of such a document on future Basque meta-planning of such a strategic document is already clearly foreseeable.

Clearly enough, the "Plan Ibarretxe" would require an amendment to Spain's 1978 Constitution, and strong forces in various parts of Spain are arrayed against any such fundamental change. On the other hand, should the "Plan" gain approval by the Basque electorate, the result would very probably be some kind of compromise and the granting of greater and clearer autonomy. However, whatever the outcome, "Plan Ibarretxe" will probably stand as one strong latent expression of "what the Basque people want" for decades to come. As such, it may well provide the basis for negotiations between Basque leaders in Spain and those in France, Nafarroa (Navarra/Navarre) and the Longroño area of the Rioja.

Required Basque megalopolitan planning

What kind of planning will be required to make the Basque settlement structure keep pace with the likely pattern of urban development most likely to evolve in coming centuries? Let us take as a point of departure the "model" of the demographer Joel A. Cohen, which he put forth about four-and-one-half years ago:

"A century from now, humanity will live in a global garden, well or badly cared-for. The majority of people will live in cities, surrounded by extensive thinly-populated zones, for nature, agriculture and silviculture. Globally, between 100 and 1,000 cities of between 5 and 25 million people each, will serve the desires of their residents, for food, water, energy, collection of wastes, political autonomy and natural and cultural amenities. Some cities will serve populations that desire to live only with other people who are ethnically and culturally similar to themselves. Other cities will serve populations attracted by ethnic and cultural diversity. Various cities will earn changing reputations by being favorable for youth, raising children, working, or retirement. The efficiency and quality of services provided by cities will depend on the quality of their administrations, on the behavioral abilities, and the courtesy of their populations."[29]

All this, as a minimum, must be reflected in Basque megalopolitan planning if it is to accomplish what it needs to in our complexly urbanizing world. There will be political constraints on how much of such planning can be adopted, as well as how much of what is planned can be implemented by specifiable government agencies and private firms.

Politics as an obstacle to Basque megalopolitan planning

All regional planning, including megalopolitan planning, is politically problematical – if only because a multiplicity of governments are involved and the implementing agencies are not the same as those doing the planning. It is always important to involve governments at a high enough level for, otherwise, plans may be made and no government is in a position to implement those plans. In the case of the Basque region the politics are necessarily more difficult.[30]

The successive governments led by the Basque Nationalist Party since 1999 have shown that it is in fact possible to build a strong domestic agenda, including meaningful regional economic and environmental planning in what has to be seen as one of the most hostile environments for reasonable decision making in recent human history. Moreover, they have made advances in housing and social policy as well. The fact remains that the hostile politics of the Basque Country are probably the main impediment to good planning of metropolitan areas and their poly-centric incipient megalopolis.[31] But accomplishments in the past three years do offer the basic concrete hope that such planning can be done.

If it can be done, the center of action-oriented planning for the entire Basque-speaking region should be on calculation of the natural-artificial trade-off forecast for each urban and environmental project. We have attributed the original insight of such a forecast above to Olmsted. The methodology for completing it largely exists in the goals-achievement matrix of the Morris Hill and in the closely related methods of distributional cost-benefit analysis of Nathanial Litchfield and others.[32] Some valuation questions remain, and these would have to be resolved by the Basque planners.

Conclusions

The existing spatial structure of the Basque Country lends itself to this kind of megalopolitan planning. We identify metropolitan areas of importance, existing and potential additional linkages among them, and the appropriate treatment of the interstices for natural environmental protection and agricultural productivity. It is in these interstices that the key strengthening of the settlement of smaller places needs to be planned – a key part of megalopolitan planning as we have come to understand it. There exist in the Basque Country, in both the Spanish and the French parts, agencies that are promising both for metropolitan and for megalopolitan planning. These agencies are not yet, however, properly oriented to the most likely pattern of urbanization to emerge in this and successive centuries. The kinds of planning that will be required are clearly suggested for the Basque homeland, as part of a complexly urbanizing world. The particularly, violence-anchored and hostile, form of political activity that characterizes the Basque Country must be seen as a most important obstacle to good metropolitan and megalopolitan planning. However, the remarkable efforts of the current Basque government hold promise that, even in this extreme political climate, good metropolitan and megalopolitan planning may still be advanced.

We shall be privileged in years ahead to see how the territorial planning of the Basque Autonomous Community, with whatever results from "Plan Ibarretxe," may result in actual development of the Basque multi-level complex of metropolitan areas and smaller centers. It will be especially interesting to see how accurately the "Territorial Model" may be realized, and especially how much nature can be preserved in the interstices of the several metropolitan and smaller centers. Or will it all fail, leaving the Basques with one huge, inefficient, ugly, messy, megalopolis?

Notes and references

1. This paper grows out of research into the past, present and future of planning among the Basques, both in Spain and France, that I have been doing since 1999. It is expected to lead to a book on the subject in 2007, but a series of papers on it have already appeared in the *Ekistics* literature since 2000. See list of references below. Parts of this paper, in a more extended version, were presented at the University of Toronto/World Society for Ekistics symposion on "Natural Cities," June 25, 2004. It is available from the author at ldmann1113@aol.com. This paper should

be seen as one of two emphases developed from that larger work. It puts stress on how strategic, not necessarily spatial or environmental planning, relates to the phenomena of globalism, on the one hand, and those of localism, on the other. The second emphasis is, under the title, "Planning the Emergent Basque Megalopolis as a Natural Multi-Metropolitan Complex," to be published in *Ekistics* in a special issue on the Toronto conference in 2006. The entire effort, starting with the Toronto effort, grew out of my work during the past several years on the question of Basque planning, developed in the Ekistics framework. The Toronto paper, in turn, grew as a companion piece and a partial updating of my paper, Mann, L.D. (2004), "Political Aspects of Planning the Basque Coastal Megalopolis," in the special issue of *Ekistics* devoted to the work of Jean Gottmann. Earlier, I presented several papers on the subject at Ekistics meetings: (1) Mann, L.D. (2001), "Euskal Herriok Ekistica," June, 2001 (Celákoviče, Czech Republic), (2a) Mann, L.D. (2001-3a), "Basque Planning and the Future of Human Settlements in Europe's Western Pyrenees Region: Updating the Euskal Herriok Ekistika Project" October, 2001, (Berlin, Germany) [Revised April, 2003], (2b) Mann, L.D. (2002-3b), "Basque Planning and the Future of Human Settlements in Europe's Western Pyrenees Region" May, 2002 [a derived short-paper]; (2c) Mann, L.D. (2002-3c), "Completing the Transition of Ekistics to the 'Applied Science of Human Settlements'," May, 2002 [a derived short-paper, with revisions]; and (2d) Mann, L.D. (2002-3), "Summary Conclusions and Synthesis for the Future of the Basque Homeland and Other Regions."

2. This broad concept "planning behavior" comes from the work of a number of American and European scholars, starting early in the second half of the 20th century. Included are Martin Meyerson and Edward Banfield, who conceptualized planning behavior as formulating alternative prospective courses of action that were expected to lead to goal or ends sought, were thought to be feasible, and that some specific individual or organization intended to do. Such behavior, which required some concept of a "public interest," was seen as an alternative to reliance on spontaneous processes, whether they be psychological, cultural, sociological, political or economic. Moreover, planning that was attempted according to rational processes was posited to be more effective and efficient than simply traditional or intuitive "feeling"-based procedures. (See their "Conceptual Scheme" in their (1955) *Politics, Planning, and the Public Interest,* Glencoe, IL, The Free Press). An even broader, but less specific, behavioral concept of "planning" was that of Y. Dror, who defined the behavior as "action-oriented thought" which could be categorized according to an array of specific dimensions. (See his "Dimensions of Planning," *Public Policy,* 1959). The most completely behavioral of the concepts of "planning" was that of Herbert Simon, who, in his various writings about human administrative behavior since about the end of World War II, eschewed any formal models of attempted rationality and, rather, relied on ways of planning that involved search for satisfactory solutions to problems, starting from full understanding of any problem and a careful knowledge of what current pre-problem action is like. More recent writing on the concept of planning behavior remains consistent with all or part of these initial concepts. See the work of the German Scholar, Andreas Faludi and the behavioral writings in Mandelbaum & Burchell collection for more recent works on planning so viewed.
3. Writing about the Basques, if it is to adequately convey the full scholarly knowledge of the subject, requires some agility in moving among the several main languages in which the literature is written. In which language should the name of a place or an idea first be given? My usage is to give the word first in Basque Euskara and then in Spanish, French, German or English, depending upon the context. Thus the name of the homeland place, *Euskadi,* may be more familiar to some readers as *"Pais Vasco," Pays Basque, Baskenland,* or "the Basque Country" (or, less frequently, "Basqueland"). I have tried to put the Basque (Euskara) name first, followed in parentheses or a forward slash, with no separating space, the French or Spanish or German name. This usage is extended to provinces and to rivers. For interim source, I have used -Eusko Juarlaritzako Hezkuntza Sailak onetsia (1994). My ultimate authority on Basque place names, however, has been "The Whole Basque Place-Name List," available on the internet at www.geocities.com/CollegePark/ 5062/topo2. It is identified as having been compiled by *Euskaldunon Egunkaria,* a Basque daily newspaper and approved by Euskalitzindia, the Basque Language Academy.
4. For perhaps the best general survey, though older works, see Alliers, J. (1999), *Les Basques* (Paris, Presses Universitaires de France) *(Que Sais-je series),* 6th ed and Oyamburu, P. (1980*), L'Irreductible Phénomène Basque* (Paris, Etente). However, for an even broader and more complete review of anything relating to Basque history, see Gonenechea (1998-2003), *op.cit.*
5. See Bronowski, J. (1972), *The Ascent of Man* (Boston & Toronto, Little Brown & Co.) for a general appreciation of the centrality of foresight applied to hunting in the interpretation of European cave paintings. For a more specific understanding of the dynamics of such anticipation, from perhaps the most important recent discovery, see Clottes, J. et al. (2001), *La Grotte Chauvet: L'Art des Origines. Op.Cit.* The documentation of the cave painters as very early Basques is provided in M. Goyhenetche, *Histoire Générale du Pays Basque,* Vol. I, Ch.1, *Op.Cit.* and in several other recent European sources. For an earlier attempt to systematize such difference in style in cave painting as well as other prehistoric art, see Leroi-Gourhan, A. (1967), *Treasures of Prehistoric Art* (New York, Harry N. Abrams) Translated from the French. Paris: Editions d'Art Lucien Mazenod.
6. For a remarkable discussion of strategy in mus, see *Le Guide de Rotard: Pays Basque (France, Espagne), 2004-05,* pp. 38-39. Excerpt: "*Mus* is almost a religion ... It is a game of diabolical subtlety... The most merciless game is of two teams of two players... It is well understood that any of the four players can bluff. ... Each phase is worth a [token], but anyone can raise. ... In the game of four players, signals, very much encoded, are authorized (eye winks, sticking out the tongue, lip gesture). You have to give your partner a signal without being seen by an adversary, but one can desire to be seen to announce a play, which make it possible to simulate the rest. It is formally forbidden to give false signals, though it is completely authorized, and even recommended to speak and lie by word. A good table of ***mus,*** then, is comprised of four liars. A player who passes cannot demand to see the cards of a winner; so he is always able to doubt that he really lost. The impassive public admires the knowledge of the adversary and of the play of the best players." For a thorough discussion of strategy in Pelote Basque, as well as in related Basque sports, historic and present, see Jakes Casaubon and Pierre Sabalo, *Euskal Pilotaren Gogoa eta Arzain Jokoak/Mémoire de la Pelote Basque et des Jeux de Bergers.* Baiona/Bayonne: Exé Haritza. 2002.
7. *Ibid.*
8. On the subject of the centrality of the traditional Basque house to the entire culture, see Jean-Claude Lasserre, Michel Duvert, et al. (1980), *Etxea, ou la Maison Basque.* St-Jean-de-Luz (France): Lauburu. (Cahiers de la Culture Basque).
9. Oyemburu, P. (1980), *L'Irréductible Phénomène Basque, op.cit.*; and Bidart, P. (2001), *La Singularité Basque: Généalogie et Usage (*Paris, Presses Universitaires de France).
10. *Ibid.*
11. For the most recent, though still incomplete, analysis of Olmsted's ideas on the human city, see Rybcyznski, R. (2000), *A Clearing in the Distance: Frederick Law Olmsted and America in the 19th Century* (NY, Scribner).
12. *Ibid.*
13. The belief was general among the faculty of Landscape Architecture at the Harvard Graduate School of Design in the 1950s, and I have often encountered it among those of that profession during the past fifty years, and still do today.
14. See his *Design with Nature* and generally his writings on the subject.
15. My discussion of Basque spatial structure parallels that of P. Laborde (1994), *Le Pays Basque: Economie et Société en Mutation.* Donostia/San Sebastian and Baiona/Bayonne, Elkar. Labord's is a pre-2000 discussion of the French Basque Country only. I have tried to extend it to the larger Spanish Basque Country, and to Nafarroa/Navarre province.
16. *Ibid.*
17. See Gabriel Sansinenia Ichaso (2001), "La Eurocuidad Bayona – San Sebastian, *LURRALDE: Investigación y Espacio.* #24. Donostia (San Sebastian): Instituto Geográfico Vasco/Euskal Geografi Elkargoa (INGEBA)
18. Sansinenia, *Ibid.*

19. Sansinenia, *Ibid.*
20. Readers who are unfamiliar with the national and local structure of government in France will need to know that the *département* is a localized unit of national government, rather than a local government *per se*. It is thus an agency of the national government for areas about the size of a county in Britain, the United States, or other countries. (The *commune* or *municipalité* is the, generally weaker, truly local level of government). The *départements* created by the centralizing Jacobins after the French Revolution, and then given force under Napoleon I, to destroy any vestiges of provincial regionalism by making the respective territories of the *departments* either much smaller or much larger than the culture-centered provinces. (The monarchy since the time of Henri IV had, for nearly 200 years, been trying to suppress regional provincialism with only very limited and uneven results). The Jacobins and Napoleon were intent on doing a more effective job. Thus it is no accident that the Atlantic Pyrenees *Département* contains virtually all of the traditional Basque-speaking provinces, plus the whole of the Occitan-speaking Bearn into a single district of the national government. The purpose was to prevent either the Basques or the Bearnese from having an effective unit of government that could concentrate on articulating any residual cultural agenda that might remain.
21. Research on this agency continues, and conclusions about it are subject to modification in later versions of this paper and more generally by the writer's future publications on the subject.
22. *Ibid.*
23. *Ibid.*
24. Some of the other traditional regions (including Nafarroa (Navarra/Navarre) and Galacia later did opt for autonomous status under the provisions of the 1978 Spanish Constitution. However, only the Basques and the Catalans have demonstrated really serious nationalistic intentions, backed by a nationalistic party (or parties) in power, of ever achieving national independence.
25. A more questionable translation would be "regional planning," for as I explain elsewhere, there is really no concept of "region" in the term. However, even Basque government officials continue to translate this term as "regional" rather than "territorial" planning. For my original insight (some decades ago) into the problems of translating *aménagement de territoire*, see my "French Regional Planning," *Journal of the American Institute of Planners* (April, 1964). Housing in Basque Autonomous Community is the focus of much social policy. Late in the last government, a new Housing and Planning Law was presented. There was no fundamental objection to it by any of the political parties, although the Popular Party objected to so much emphasis on low cost housing. But, because of Plan Ibarretxe, there was a desire on the part of all opposition parties to demonstrate that the PNV coalition could not get its way on any broad area of policy. Thus the Housing and Planning law was prevented from going to a final vote. It is one of the matters that needs to be brought up by the new (2005) government, though it has yet to be introduced. The votes of the new EHAK (Basque Communist) senators may turn out to be crucial this time.
26. *Euskal Autonomia Ergedegoko Lurraldean Antolamendrako/Directrices de Ordinacion Territorial de la Comunidad Autonomo del Pais Vasco* [Directives of Territorial Planning of the Basque Autonomous Community]. *Eusko Jaudaritzaren Argitalpen Zeritzu Nagusia (Servico Central de Publicaciones) [Basque Central Publications Service]* for EuskoJaudaritz Lurralde Antolamendu Etxebizitzia Salia (Gobierno Vasco, Departamento de Ordenación del Territorio, Vivienda, y Medio Ambiente) [Basque Government, Department of Territorial Planning, Housing, and Environment], Gasteiz (Vitoria)[Vitoria-Gasteiz, Spain, 2001 (2nd ed.), 335 p. (illustrated), in Euskara and Spanish.
27. *Fundación Metropoli, Euskal Hiria: Proictua/Ciudades Vascas: Proyecto*; [Basque Cities: Project. Bilingual editions: Euskera-Spanish, Euskera-English, etc.]. *EuskoJaudaritzaren Argitalpen Zeritzu Nagusia (Servico Central de Publicaciones) [Basque Central Publications Service]* for EuskoJaudaritz Lurralde Antolamendu Etxebizitzia Salia (Gobierno Vasco, Departamento de Ordenación del Territorio, Vivienda, y Medio Ambiente) [Basque Government, Department of Territorial Planning, Housing, and Environment], Gasteiz (Vitoria) [Vitoria-Gasteiz, Spain, 2002. 245 pp. (illustrated).
28. President Ibarretxe, in his first two posits does not go much further than to provide a modern re-statement of the principal ideas that lead to the creation of the 19th century Basque nationalism movement. However, the new element in the first point is that of "association" of the Basque community with the Spanish state; in the second point, the legitimizing criterion of having the Plan passed by the Basque Senate. The third point, with its idea of negotiations between the Basque Autonomous Community with Basque minorities in Navarra and France (as well as, potentially, Basque communities in other nations) could provide the basis for various kinds of joint or multiple decision making. Since the elections (in early August, 2004), Jon Imaz, President of the Basque Nationalist Party, has issued a long statement, giving essentially the same principles as those of the Party, without mentioning the Plan Ibarretxe. The one possible change may be in advocating "shared sovereignty" in place of the right to end a "free association" with the Spanish state. The difference may be more apparent than real; for "shared sovereignty" was one of the implicit alternatives if the Basques ever did end their "free association" with the Spanish state. In any case, "shared sovereignty" is currently the focus of political debate, moving attention away from Ibarretxe and his Plan – at least nominally and at least temporarily.
29. The political situation has changed fundamentally since the Popular Party lost to the Socialists in mid-2003. The latter have proved open to negotiation with the autonomous communities, including the Basques. The Basque Nationalist Party and its two allies called new Basque elections in May, 2005. The gamble was that the coalition would gain a large enough majority to push the Socialist Spanish government to include major parts of the Ibarretxe Plan into a new statute for the Basque Autonomous Community. That did not happen. The votes that the moderate nationalist Coalition had counted upon to join it as a consequence of Spain's outlawing the ETA-oriented Batasuna Party rather went to a new Party, the Basque Communist Party (*EHAK*, for those words in *Euskara*) who got nine seats in the Senate (compared to the seven that Batasuna had in the last parliament). These *EKAK* people were all virtually unknown candidates, with no traceable links to ETA or to *Batasuna*, but who have shown since that their sympathies nevertheless lie in that radical-nationalist orientation. (They are under constant attack by the Popular Party for being mere surrogates for the outlawed *Batasuna* Party, and ultimately for ETA. The Socialists refuse to prosecute them under the "Law of Parties," citing insufficient evidence.) The PNV-EA combination lost four seats, while the Socialists gained four, and the Popular Party lost four. The 2005 legislature thus has 39 Basque-nationalists, 3 members of the former Spanish Communist party, who tend to vote with the Basque-nationalists, and just 33 Spanish-nationalist members. But only 29 of the Basque-nationalist are moderates, the other 9 being the left-radicals of EHAK. (On the Spanish-nationalist side, the Socialist party should be considered moderate, and will advance somewhat greater Basque autonomy; but they will probably never vote with the Basque-nationalists on any key issue that seriously threatens Spanish constitutionalism. The right-wing Popular Party must be viewed as frankly anti-Basque and anti-autonomy.) The nationalist cause lost two votes, but the hostility of the increased *EHAK* group to the PNV will make it even harder for coherent Basque-Nationalist policy to be put forward. The shift in parliamentary strength enabled the Socialists, supported by the Popular Party, to advance a Spanish-nationalist candidate for president/*lehendakari* who came seemingly very close to defeating Ibarretxe's attempt to be re-elected. Twice there was a tie between the Basque-nationalists and the Spanish-nationalist for the presidency. EHAK members withheld their support for Ibarretxe until the very last minute, when just two of them gave him just enough votes to repeat as leader. (Obviously, *EHAK* could have given all nine of their votes had the Spanish-nationalist challenge been any stronger.) The narrowness of the differences in stated policy of the two different Basque-nationalist approaches do not make it any easier for the moderates and the left wing radicals to work together. *EHAK* promises to behave exactly the way that the *Batasuna* had done in the prior government: giving the Basque Nationalist Party just enough support to keep some other party from governing, but no more than that. The path ahead for the Plan Ibarretxe and for moderate nationalist policy will be challenged at every point, both by the more radical nationalists of *EHAK* and the Españolists of the Socialist and Popular parties.

The violence of ETA seems to be temporarily restrained, though incidents of major property damage continue sporadically, and the street violence of teenager ETA-recruits (*kale borroka*) is an increasing problem. Perhaps the radical-left will be content to mute the violence that they have used as a way of agenda-control in recent times, doing that instead by the 9-vote bloc in the parliament. But it would be naive to suppose that the violent aspect of Basque nationalism is at an end, for incidents of non-mortal violence continue to be almost a daily occurrence.

Much of my research on the political context of Basque planning has been done through a daily monitoring of Spanish Basque and some French Basque newspapers, largely through the internet. While I do not cite each of the multitude of newspaper references supporting my detailed narrative on Basque politics in the original version of my papers, the original references do exist and are available on request and at cost. The reader can get many of them on the web, at www.elpais.esp, under "temas," and then "La Ofensive Terrorista" or "ETA". Supplementary information is at www.elcorreo.electronico.es and www.eldiariovasco.es, plus eldiariodenavarra.es. For the French Basque area, see www.sudoest.fr and www.semainebasque.fr. All are, however, in the Spanish, French or *Euskara* languages, respectively.

For a more complete examination of Cohen's views, and my own proposed modifications to them, see my "Political Aspects of Planning the Basque Coastal Megalopolis", *op.cit.*

30. J.A. Cohen, (1998), "A Global Garden in the 21st Century," in Phi Beta Kappa, *Key Reporter,* Spring, 1998. (Based on a talk by Cohen to the syndics of Columbia University in March, 1997 at Biosphere 2, Oracle, Arizona, USA. Lawrence D. Mann (1998), "Planificación del Futuro Urbano de las Américas," in his *Conferencias sobre Planificación Comparativa en las Américas.* Tucson, Arizona, USA and Panama City, Panama: Programa Arizona-Panama. This document is available in Spanish from the author.

    For a more complete, though now outdated, analysis of the unique politics of the Basque region, see my "Political Aspects of Planning the Basque Coastal Megalopolis," *op.cit.*
31. See note 28, above.
32. See M. Hill (1967), "The Goals-Achievement Matrix in Urban and Regional Planning," *Journal of the American Institute of Planners;* N. Litchfield et al. (1970), *Evaluation in the Planning Process* (London, Kegan Paul).

Metropolitan regions: New challenges for an urbanizing China

Edward Leman

The author is President of Chreod Ltd., a consulting firm he founded in 1985 in Canada. Since 1988 the firm has worked on over 80 urban and regional development consulting projects in over 70 cities across China. Mr Leman's work has largely been on strategic development planning and policy development for municipal governments in China, and for the World Bank and Asian Development Bank. He has worked in Shanghai, Tianjin, Beijing, Chongqing, and in Anhui, Hebei, Henan, Gansu, Jiangsu, Zhejiang, Guangdong, Guangxi, Guizhou and Sichuan Provinces. Mr Leman has published articles on China urban issues in Ekistics, *the* Asian Wall Street Journal, *the* World Bank's Urban Age Journal, *and the* Far Eastern Economic Review's China Trade Report. *Mr Leman is a member of the World Society for Ekistics and served as a member of its Executive Council from 1995-1998. This article is derived from his presentation at the international symposion on "The Natural City," Toronto, 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics, and a subsequent paper that he delivered at the World Bank Urban Research Symposium held in April 2005 in Brasilia.*

Introduction

At some point during the 1970s, China passed the US to become the country with the largest number of urban residents in the world. Despite a long political and cultural bias against urbanization, market-oriented reforms since then have created conditions that will transform China into a predominantly urban nation early in the next decade (fig. 1). Experience in the last 15 years suggests that the bulk of this urbanization will continue to occur in and around over 50 expanding metropolitan regions, most of which now spill over municipal boundaries that no longer capture urban markets.

This paper has three objectives:

- The first is to report on interim findings of research that my firm has conducted over the last few years on metropolitan regions in China to inform policy advice to municipal, provincial and central government agencies, largely under the aegis of World Bank

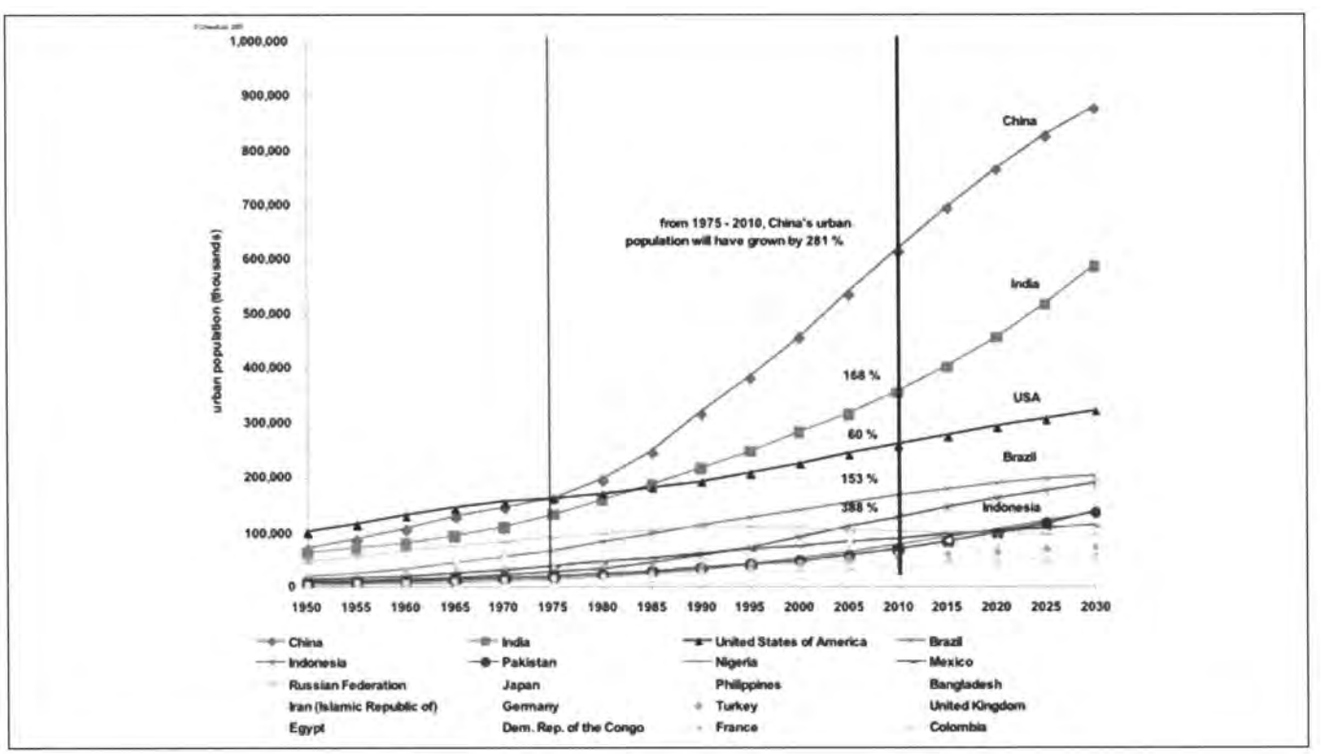


Fig. 1: Urban populations of selected countries (1960-2030). (*Source*: UN World Urbanization Prospects – The 2003 Revision).

and ADB technical assistance. Most recently, this included two "City Development Strategy" (CDS) consulting assignments for the Cities Alliance[1] in nine urban and metropolitan regions in China, targeted specifically to improving the social, economic, and institutional linkages between the traditional "city proper" (comprised of districts of the statutory cities) and surrounding small and intermediate cities, towns and villages that together comprise the "city-region."

- The second objective of this paper is to propose an agenda for focused, comparative research that could help governments in China to better manage the development of metropolitan regions through better public policy.
- The third is to encourage urban and regional researchers from around the world to become far more actively engaged with China in defining more effective ways for managing the country's transition to an urban and largely metropolitan nation.

There are two key findings from the CDS work that we have conducted in China and in a similar vein on 15 other city regions over the last four years[2]:

- The first is that the agglomeration benefits experienced in many city regions in more advanced economies are accruing haltingly and only in limited ways in China.
- The second is that un-managed metropolitan regional growth is having negative impacts both in suburban and central areas, including pollution, congestion, and distortion of land and labor markets.

While most city-regions in China are not yet enjoying the net benefits that agglomeration in metropolitan regions can induce in productivity improvements, trade, innovation, employment generation, and hence poverty alleviation, they are incurring mounting costs (including opportunity costs) of incomplete, inefficient, and ineffective agglomeration. These costs are being borne by all major stakeholders – governments, enterprises, and households – but particularly by more vulnerable suburban town and township governments, small and medium size enterprises (especially in suburban areas), migrants, and suburban landless farmers.

Defining metropolitan regions in China

Defining the boundaries and structure of a "functional metropolitan region" requires current and reliable data on the type, volume, and direction of economic and social flows. As in other countries, because of data limitations[3] proxies must be used to identify the majority of periodic social and economic interactions occurring in urban and metropolitan regions within a reasonable travel-time from the center of China's cities. Research in other countries suggests that a one-hour travel time is generally the limit that households are willing to spend for most journeys to work, and that most suppliers to enterprises can effectively travel for daily deliveries. Assuming motorized vehicles as the dominant mode of movement, this equates roughly to a maximum radius of 50 km from the urban core when accounting for lower travel speeds in more congested central areas.

China's urban regions differ significantly from North American and European cases in the distribution of places of residence and places of work. Private vehicular ownership is low, regional commuter transit (such as in Tokyo, Paris and New York) do not yet exist, and distances to work are generally much smaller in China. This is partly due to

- the development after liberation of large, self-contained State Owned Enterprise (SOE) complexes that included factories, residences, and public facilities in one location; and,
- the TVE industrialization model in which places of work and residence are scattered in suburban towns.

Therefore, in China more so than in Europe and North America, there is a much stronger correlation between population density and employment density, and hence of production. Constraints to physical mobility mean that the 50 km radius is probably a maximum catchment area. A one-hour drive time is possible by enterprises, most of which have access to motorized transport. But the majority of urban residents rely on inner-city public buses, bicycles and walking to get to work: their one-hour travel time distance is considerably more circumscribed. While regulatory impediments were, until recently, the greatest constraints to labor mobility in urban markets, physical accessibility is emerging as the most significant impediment to labor flows within China's emerging metropolitan regions, particularly from suburban areas.

Method no. 1: Analysis of towns, townships and street committees

Given these conditions, two approaches have been followed in identifying and describing the spatial extent and structure of metropolitan regions in China. The first is detailed analysis of population distribution conducted at the town/township and Street Committee scale, and is therefore data-intensive. Small-scale, accurate data on population became available in China in 2002 in analog form using information collected during the 2000 National Census. For the first time, government enumerated individuals where they were living when the census was taken, including migrant populations resident for longer than six months. This provided relatively accurate information on actual populations that accounted for in- and out-migration. The data are available at the statutory Town, Township, and Street Committees; this approximates the scale of census tracts in Canada and the US, and Nomenclature of Territorial Statistical Units[4] (NUTS) 5 units in Europe. Assuming a strong correlation between employment and population density, it appears that the 2000 Census data on population, when analyzed spatially, could provide a reasonable proxy for delineating not only the spatial structure of interactions (location and size), but also an indication of the intensity of these interactions through population densities.

The first method for defining urban and metropolitan regions was developed on recent projects in the Pearl River Delta and Shanghai, and therefore was initially calibrated in large and dynamic metropolitan regions.

It consists of eight principal steps:

- digitizing on GIS the small-scale population data from the 2000 Census;
- calculating, using spatial analysis techniques on the GIS, population densities in a 4 km radius from every Town, Township and Street Committee point[5];
- defining geographic constraints to urban development by calculating slopes over 8°,[6] waterbodies and floodplains;
- overlaying current digitized spatial data on National Trunk Highway System (NTHS) and national and provincial highway networks; and
- overlaying digitized traffic volumes.[7]

Population density grids were then re-classified into

- "zones" of density increments (step no. 6) with the lowest gradient being 500 inh/sq.km (in line with approaches followed in the EU by Eurostat[8]); and
- one-hour drive times from city centers were calculated using average incremental road speeds on NTHS and national highways in which design speeds were lowered to account for increasing congestion in central areas (step no. 7).
- The results of all of these calculations were then overlaid to provide for:

– the definition of Metropolitan or Urban Region (maximum) boundaries as the limits of generally contiguous population densities over 500 inh/sq.km following existing road networks (and

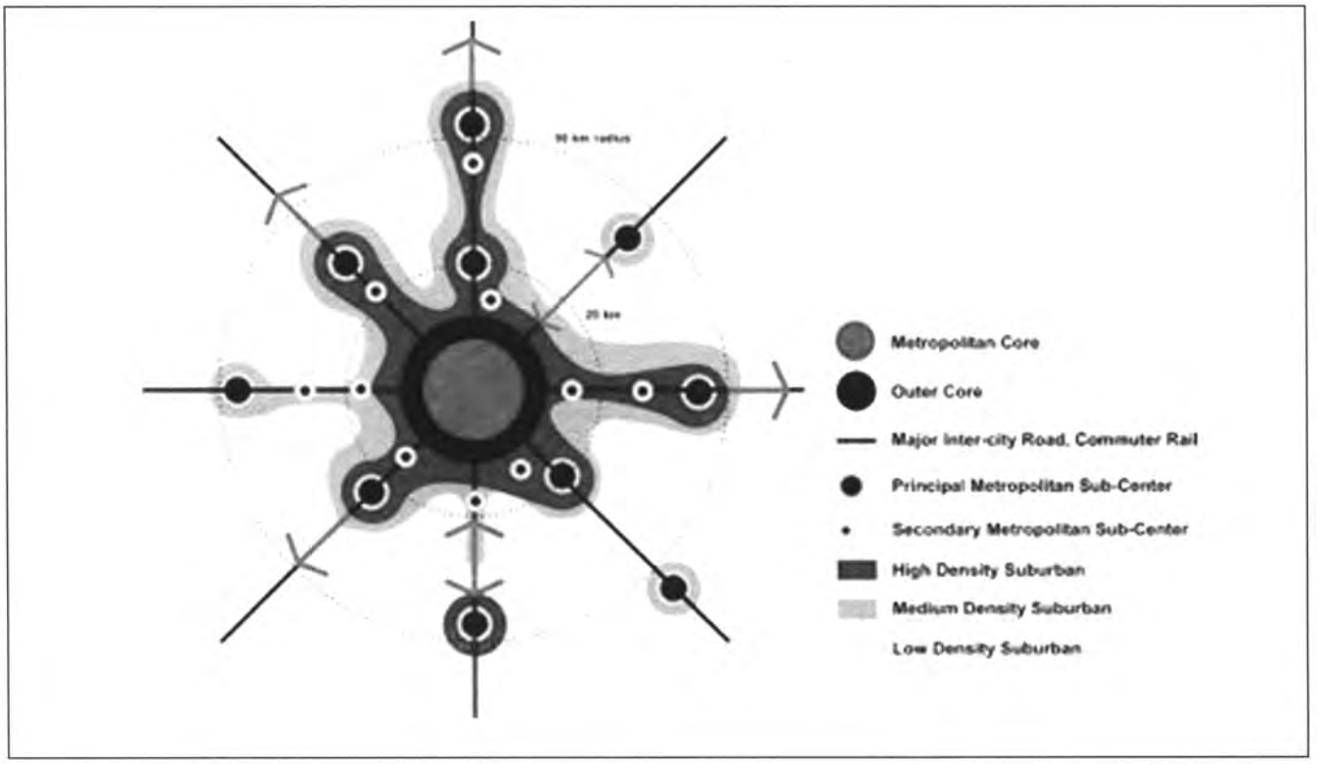


Fig. 2: Schematic structure of metropolitan regions.

checked against traffic volumes from 1996); and
– the identification of key elements of the spatial structure of the region in the form of settlement nodes (density 'zones') and links (principally road networks).

The result is a generalized descriptive spatial model of Metropolitan Regions shown on figure 2. The Chinese metropolitan region generally covers a territory within a 50 km radius from the center of the core city which ranges in drive time from one hour on expressways to two hours on local roads. This is broadly consistent with findings on European metropolitan regions, and with recent research by others on Southeast Asian metropolitan regions.[9] The spatial structure of the Chinese metropolitan region generally appears to be comprised of a metropolitan core, a concentric outer core, principal metropolitan sub-centers (large towns and small cities), smaller metropolitan sub-centers, high and medium density suburban areas adjacent to the outer core and in clusters and corridors farther out from the core, and low density suburban areas (500–1,000 inh/sq.km) in clusters and corridors (table 1). This generalized descriptive model is a working hypothesis: patterns vary among regions depending on geography, human and social capital endowments, production patterns and transportation infrastructure. A similar but less atten-

Table 1
Characteristics of metropolitan region zones

	METROPOLITAN REGION ZONES		LOCATION	DENSITY	FORM	
MR Core	Metropolitan Core (high density)	MC	central in region	> 15,000 inh/km2	principal regional node	
	Metropolitan Core (low density)	MC	central in region	7,500 - 10,000 inh/km2	principal regional node (principally in North America)	
	Outer Core	OC	surrounding Metropolitan Core	5,000 - 15,000	concentric ring	
Suburban Areas	Principal Metropolitan Sub Centers	PMSC	dispersed, mostly within 50 km radius	3,500 - 15,000	concentrated, large sub-regional node	generally structured as corridors and settlement clusters
	Secondary Metropolitan Sub Centers	SMSC	dispersed, mostly within 50 km radius	3,500 - 5,000	smaller concentrated node	
	High Density Suburban	HDS	surrounding OC, PMSC, MSC	2,000 - 5,000	concentric around OC; corridors, clusters	
	Medium Density Suburban	MDS	connecting OC to PMSC, MSC	1,000 - 2000	clearly-defined, often contiguous corridors and clusters	
	Low Density Suburban	LDS	dispersed throughout Metropolitan Region	500 - 1,000	dispersed	
	Very Low Density Suburban	VLDS	dispersed throughout Metropolitan Region	250 - 500	dispersed	

Table 2
Urban and metropolitan regions analyzed to date using Method no. 1 (Census Tract equivalent)

			population (2000)	
CHINA	Metropolitan Regions	Shanghai MR	17,266,863	
		Beijing MR	14,538,227	
		Guangzhou MR	13,745,326	
		Chengdu MR	11,207,318	CDS2
		Xian MR	9,406,327	
		Tianjin MR	9,176,949	
		Chongqing MR	8,656,887	
		Shijiazhuang MR	7,660,495	
		Shenzhen MR	7,014,490	
		Handan MR	6,767,526	
		Zhengzhou MR	6,486,078	CDS2
		Tangshan MR	5,623,742	
		Luoyang MR	5,019,310	
		Lanzhou MR	2,474,777	CDS2
		Baotou MR	1,967,308	
	Urban Regions	Xinxiang UR	2,177,637	CDS2
		Qinghuangdao UR	1,361,286	
		Zhangjiakou UR	1,240,460	
		Chengde UR	602,466	
		Erdos UR	320,576	CDS2
		sub-total: China	**132,714,048**	20 cases
INTERNATIONAL	Metropolitan Regions	Tokyo MR	33,568,477	
		Seoul MR	22,729,502	
		London MR	13,749,443	
		Paris MR	10,371,566	
		New York MR	16,196,635	
		Toronto MR	5,403,051	
		Atlanta MR	3,209,011	
		sub-total: int.	**105,227,685**	7 cases
		TOTAL:	**237,941,733**	

uated structure applies to "urban regions", defined as those anchored on cities with core populations less than 1 million, stretching out generally no further than 25 km from the city center.

This method for identifying and defining the spatial characteristics of metropolitan regions has been calibrated from analysis of the five city-regions in the second CDS project in China (CDS2) and recently to fifteen other urban and metropolitan regions in various parts of the country (table 2). In addition, to compare China's regions with metropolitan regions internationally, two MRs in Asia, two in Europe, and three in North America were also analyzed using the same approach (same variables, same size of smallest spatial unit for population data, and the same data year, 2000). Therefore, the research is not only based on analysis of the five CDS2 client cities: 27 urban and metropolitan regions, with a total population of over 200 million residents, have comprised the empirical base for our interim findings.

Research on the spatial structure and characteristics of additional metropolitan regions in China and other countries is continuing as resources permit. Once a consistent sample of suitable size has been constructed, statistical analysis will be conducted to identify possible correlations between spatial characteristics and locational, demographic, economic, and transport variables.

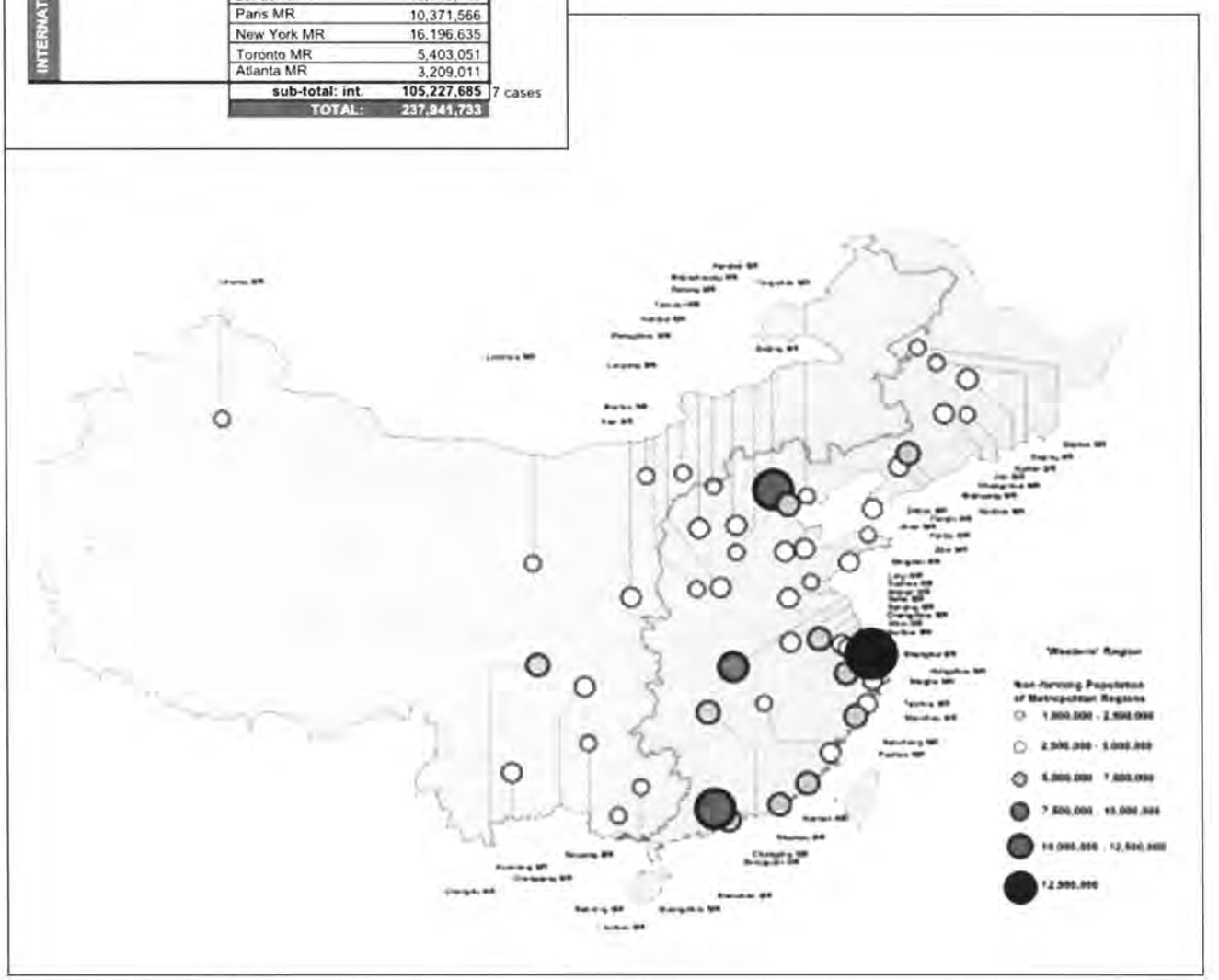


Fig. 3: China's 53 metropolitan regions by size of non-farming population, 2000. (*Source*: Chreod Ltd calculations from *2000 National Census* and *2001 Provincial Statistical Yearbooks*).

Method no. 2: County/city-based analysis of all potential metropolitan regions in China

The results of the analysis of 27 urban and metropolitan regions – 20 of which are in China – provided a working hypothesis for identifying and analyzing the likely remaining metropolitan regions in China using more readily available but much coarser data at the county and city level. The basic hypothesis is that, when viewed as aggregates of counties and cities, metropolitan regions in China:

- are anchored on the urban districts of statutory cities with over 1 million non-farming residents[10];
- spill over to capture non-farming populations and enterprises in towns and cities in adjacent counties and county-level cities (CLCs) that are connected by good quality roads (either NTHS or national highway segments with road quality above Class); and,
- are comprised of the core city and adjacent counties or CLCs generally within a 50 km radius of the center of the core city, representing a notional 1-2 hour travel time.

Analysis of traffic volumes along the national highway network suggests that a few MRs likely spill over to capture selected counties beyond those immediately adjacent to the core city, i.e. that the reach of some MRs is wider than 50 km. While this hypothesis requires testing using the more detailed approach in Method no. 1, resources for such analysis on all remaining MRs in China (38) have been well beyond the scope of our recent consulting assignments.

China's 53 metropolitan regions

According to the county-based Method no. 2, there are 53 metropolitan regions in China anchored on cities with over 1 million non-farming residents and encompassing selected adjacent counties (fig. 3). These appear to be China's main economic engines. They hold almost 370 million people, or 29 percent of the country's population, but produce 53 percent of China's GDP and 62.3 percent of all non-farming GDP from manufacturing, construction and services (fig. 4). The biggest metropolitan region in China is Shanghai with an urban population of over 17 million followed by Beijing (14.5 million) and Guangzhou (13.7 million). A second tier of 11 metropolitan regions has urban populations ranging from 5 million to 10 million. A third tier with populations ranging from 2 to 5 million includes 20 regions. There are 19 small metropolitan regions with populations ranging from 1 to 2.5 million. While first and second tier metropolitan regions are concentrated along the coast, many of China's medium and small

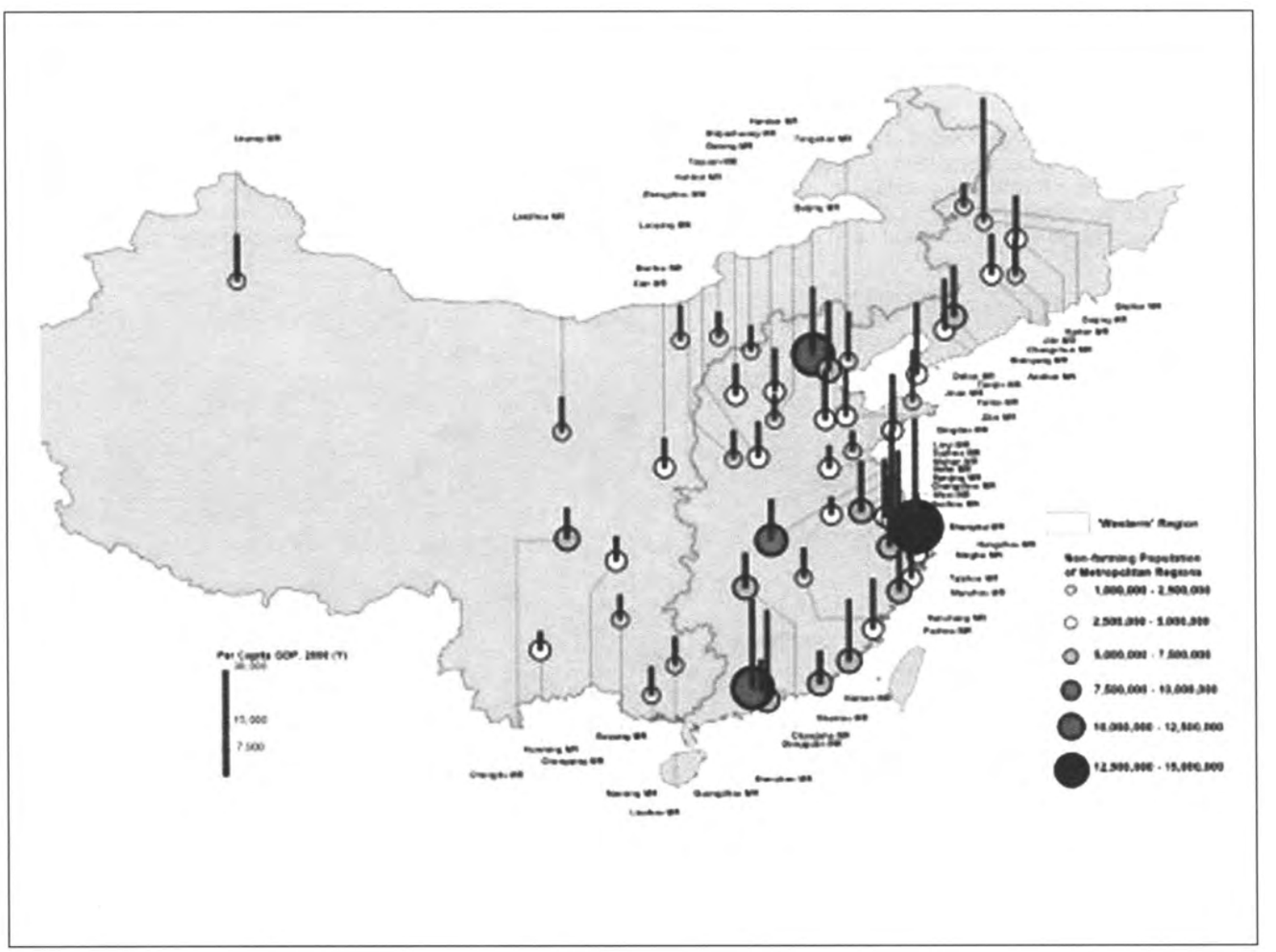


Fig. 4: Per capita GDP in China's 53 metropolitan regions, 2000. . (*Source*: Chreod Ltd calculations from *2000 National Census* and *2001 Provincial Statistical Yearbooks*).

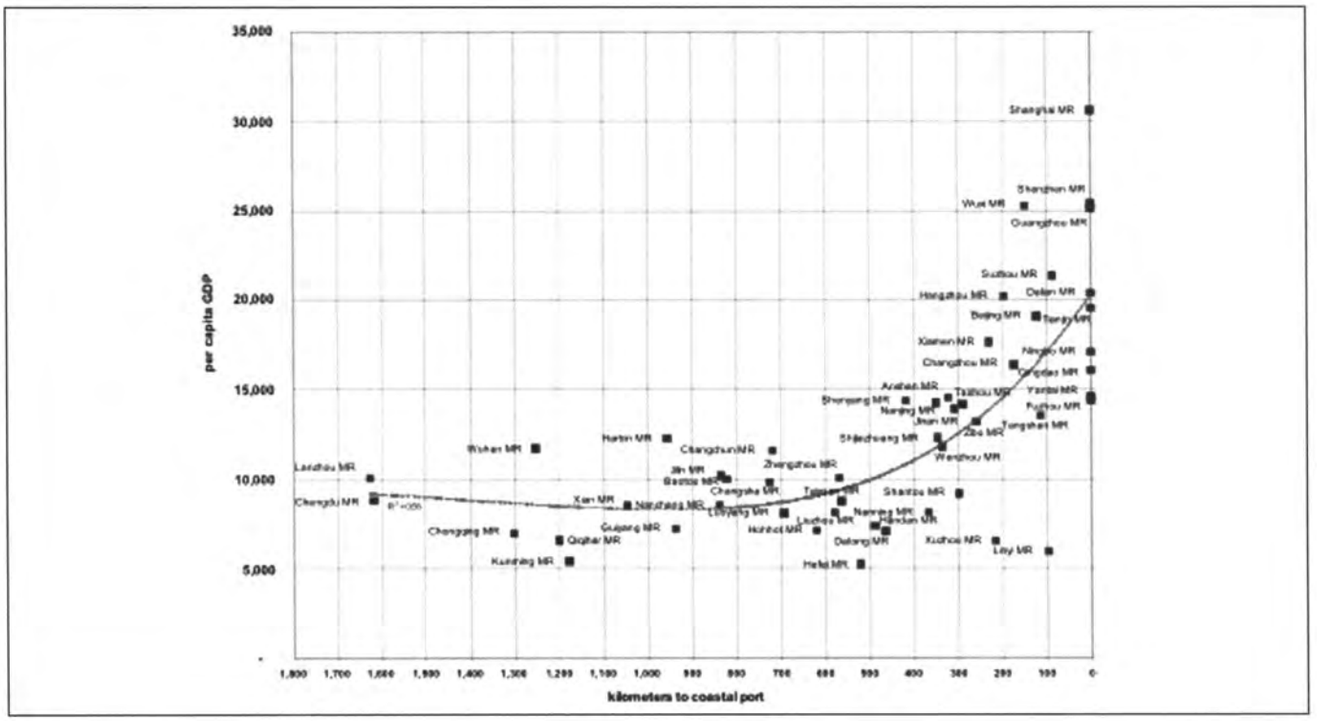


Fig. 5: Distance to coastal ports and per capita GDP. (*Source:* Chreod Ltd calculations).

size metropolitan regions are located inland. Although distance to coastal ports does appear to matter to economic development in these metropolitan regions, per capita GDP is at the medium range even in some selected inland locations, such as Harbin, Zhengzhou, Changsha, Xian, Chengdu and Lanzhou (fig. 5). Conversely, there are few cities within 500 km of coastal ports that are seriously lagging.

Metropolitan regions are China's major centers of productivity and wealth (fig. 6). Per capita GDP within 50 km of the centers of metropolitan regions is 160 percent higher than the national

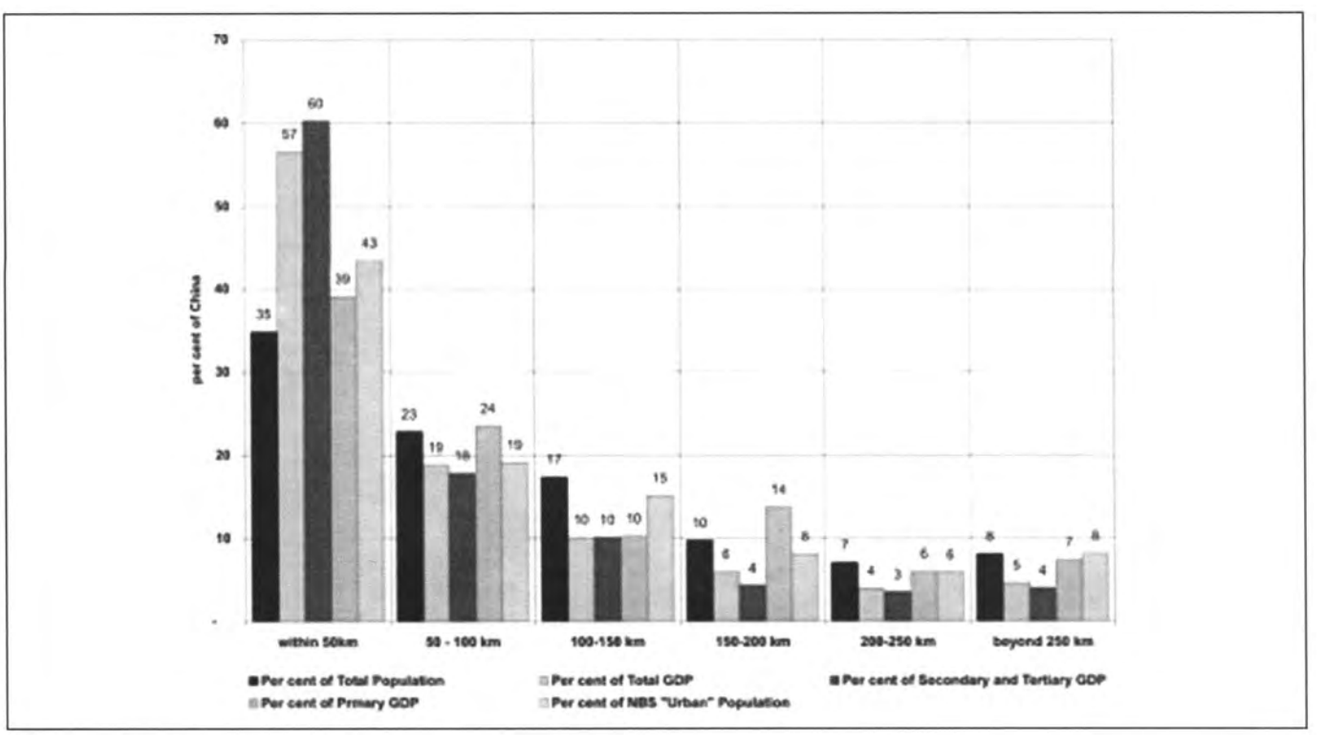


Fig. 6: Metropolitan regions' share of China's population and output (from city center).

average. This rate falls dramatically at a distance of 50-100 km from the metropolitan core, drops again beyond 100 km, and remains relatively stable beyond 100 km, no matter how far out from the center.

Five key challenges facing China's metropolitan regions

While China has consistently enjoyed high economic growth rates over the last 15 years, policy makers are becoming increasingly concerned that:

- growth has largely been generated from investment;
- much of that investment has been to prop up unprofitable SOEs and from foreign enterprises into narrowly defined sectors in a very limited number of largely coastal locations to facilitate exports (i.e. external consumption);
- only a handful of cities are progressing up global supply chains by adding higher values to manufacturing and services; and,
- the potentials for metropolitan regions to generate wider and sustained employment growth are not being effectively realized.

But the challenges are not only economic: in our report to central government agencies on national implications of CDS2, we outline ten issues that need to be quickly addressed in China's metropolitan regions.[11] Five of these, related more closely to "Urbanization, Land Policy, and Urban Form" are reviewed in this paper.

Realizing urbanization economies

Most of China's metropolitan regions have low levels of urbanization,[12] and hence unrealized agglomeration benefits that generally accord to highly urbanized regions. Only 15 of 53 MRs have urbanization levels over 70 percent. Of these, 11 MRs have per capita GDP in the top half of the range of all metropolitan regions (fig. 7). The four MRs with urbanization levels over 70 percent but with per capita GDP in the bottom half are producers of low value-added manufactures (Dongguan, Wenzhou and Taizhou) or are very isolated in the west (Urumqi). Except for Urumqi, all the MRs in central and western China have urbanization levels under 70 percent, with the majority in the 40-60 percent range; all of these have per capita GDP in the bottom half of the range of all 53 MRs. However, there are also 14 coastal MRs with low or moderate levels of urbanization. Of these, five are in Shandong Province, three in Liaoning, three in Hebei, two in Jiangsu, and one in Fujian. While just over half of China's metropolitan regions are in coastal provinces (28 of 53), half of these have urbanization levels under 70 percent. There is, therefore, considerable scope for additional urbanization in both coastal and interior metropolitan regions.

Significant correlation appears to exist between the degree of

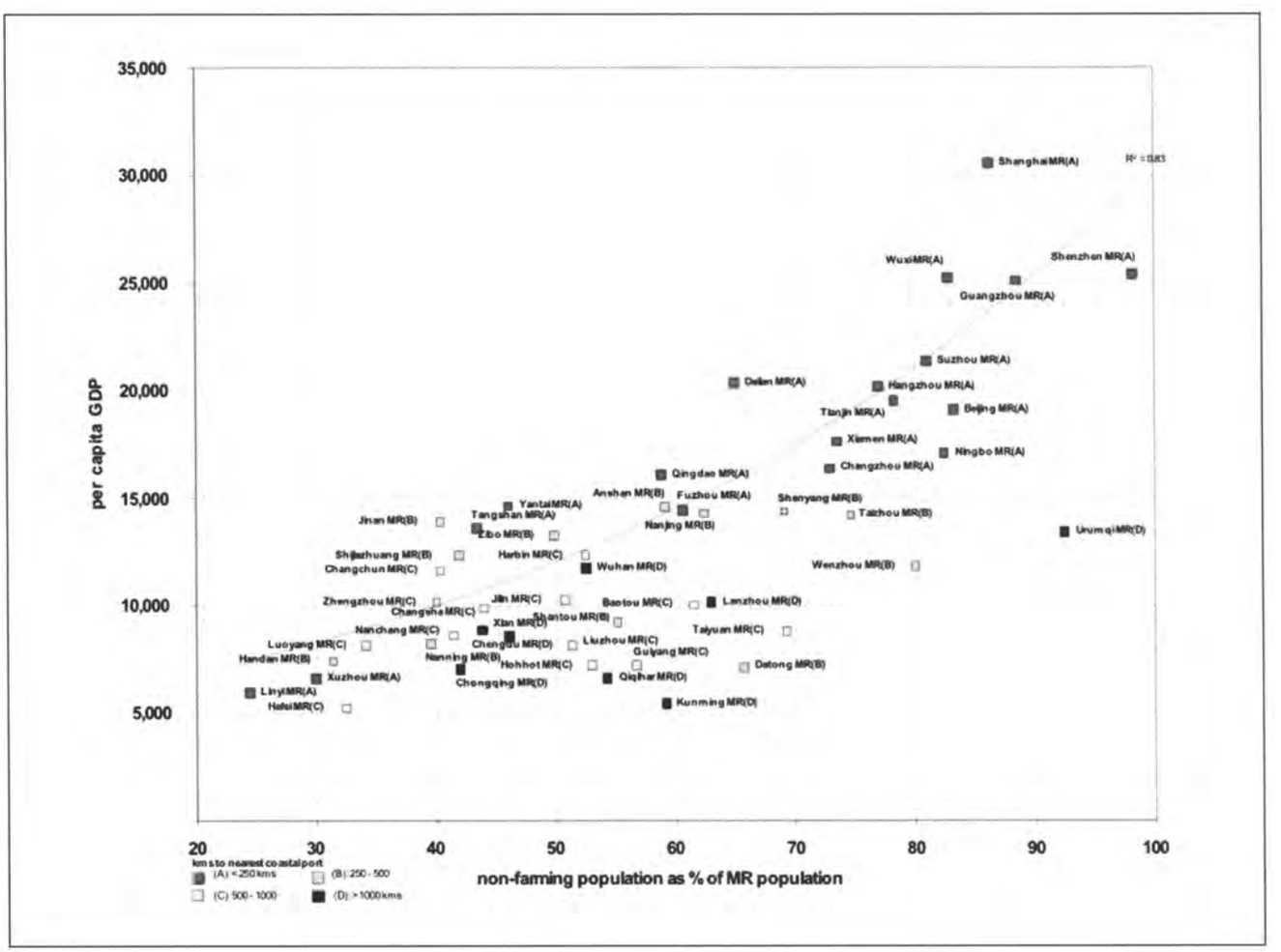


Fig. 7: Urbanization and per capita GDP in China's 53 metropolitan regions, 2000.

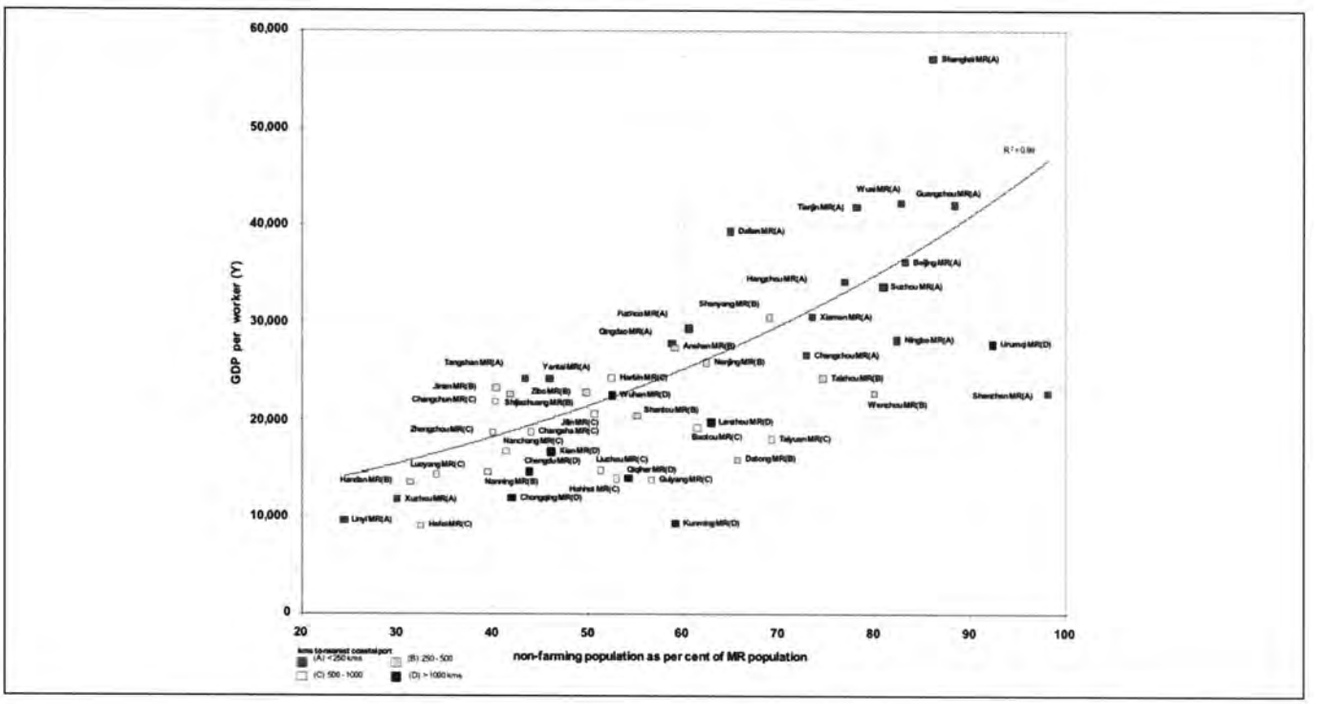


Fig. 8: Urbanization and labor productivity in China's 53 metropolitan regions, 2000

urbanization and economic prosperity of metropolitan regions. Not surprisingly, labor and spatial productivity are higher in metropolitan regions that are more urbanized (figs. 8 and 9).

However, the population size of metropolitan regions also appears to matter (fig. 10). Smaller MRs with under 2 million non-farming residents have lower levels of per capita GDP, reflecting

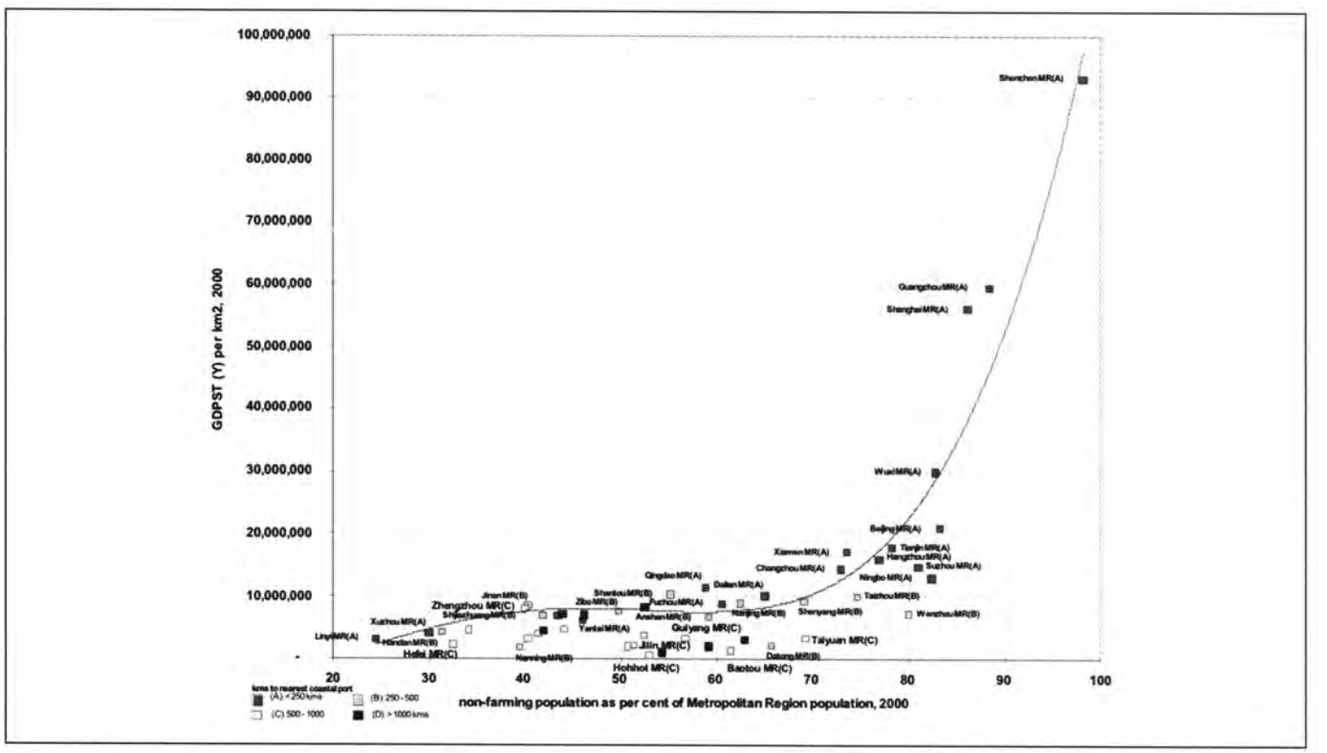


Fig. 9: Urbanization and spatial productivity, 2000.

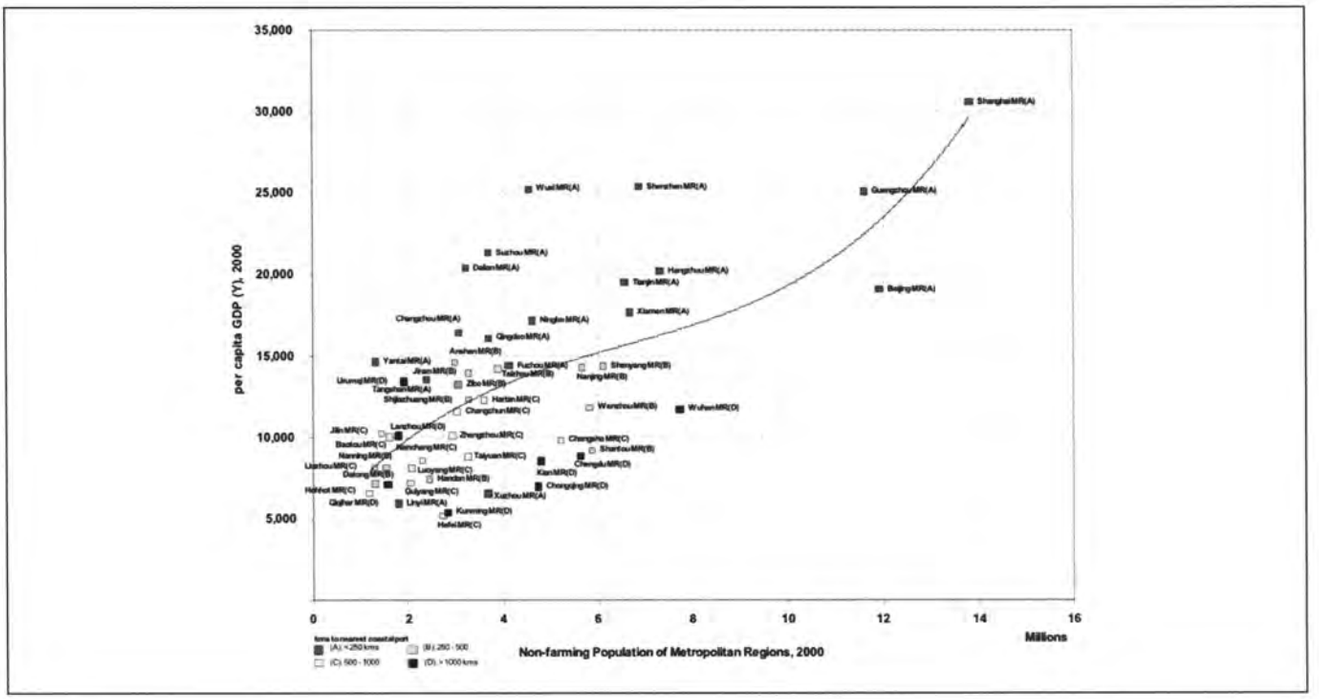


Fig. 10: Per capita GDP and population size of metropolitan regions, 2000.

lower agglomeration economies. All of these, except for Yantai MR, have per capita GDP levels in the bottom third of the range of the 53 metropolitan regions, and all are non-coastal.

Statutory towns are very important elements of China's metropolitan regions. In most MRs, well over 30 percent of the total regional population lives in towns (fig. 11). As a whole, statuto-

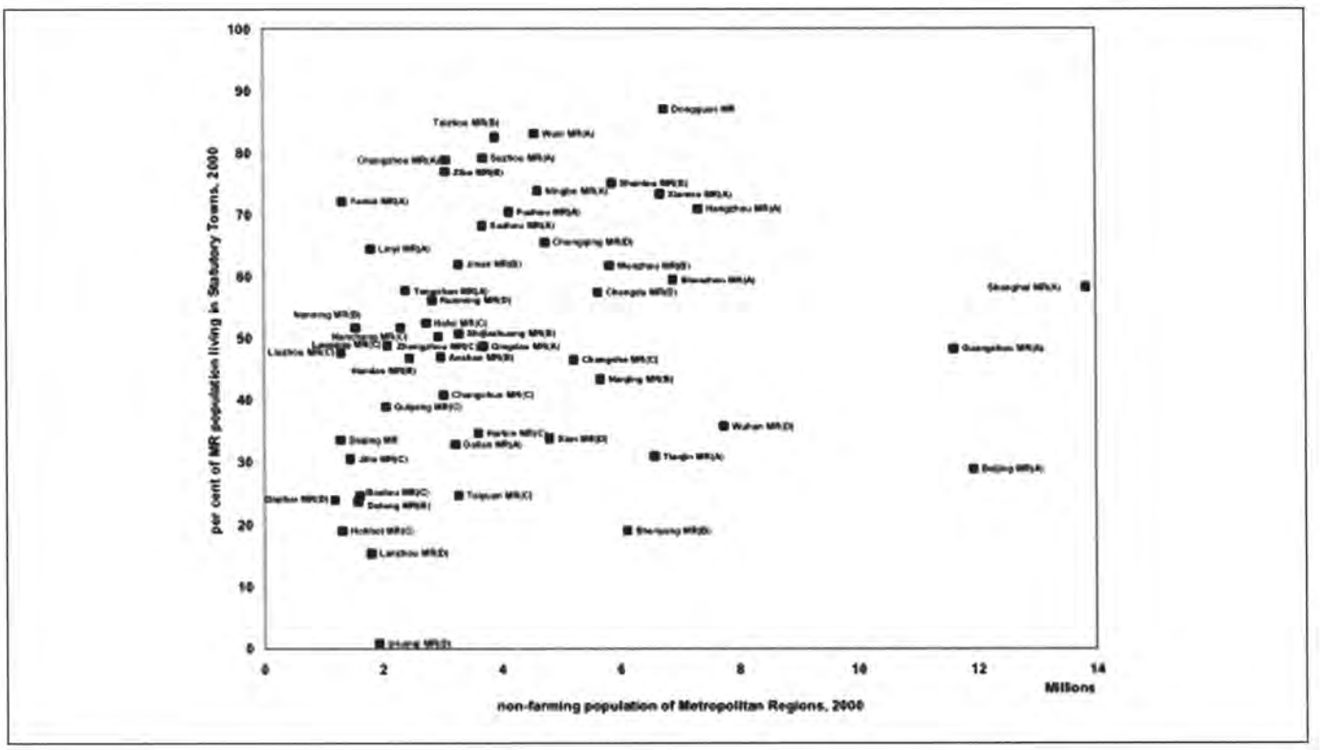


Fig. 11: Towns in China's 53 metropolitan regions, 2000.

ry towns now hold 52 percent of China's metropolitan region population; in 27 of the 53 MRs, towns account for more than half the total number of residents. While there are certainly many exceptions, these towns are generally characterized by: far lower population densities than the central metropolitan areas; low statutory designations of densities through town-administered development controls (e.g. floor-area ratios); comparatively weaker control over conversion of land for urban development; limited and in many cases rudimentary social services; small and scattered, intensive-intensive enterprises; lower levels of human capital in terms of educational and training attainment; limited fiscal capacities (particularly in light of the recent banning by the Ministry of Finance of town-based extra budgetary fees); and governance systems designed to manage farm-based rather than urbanizing economies.

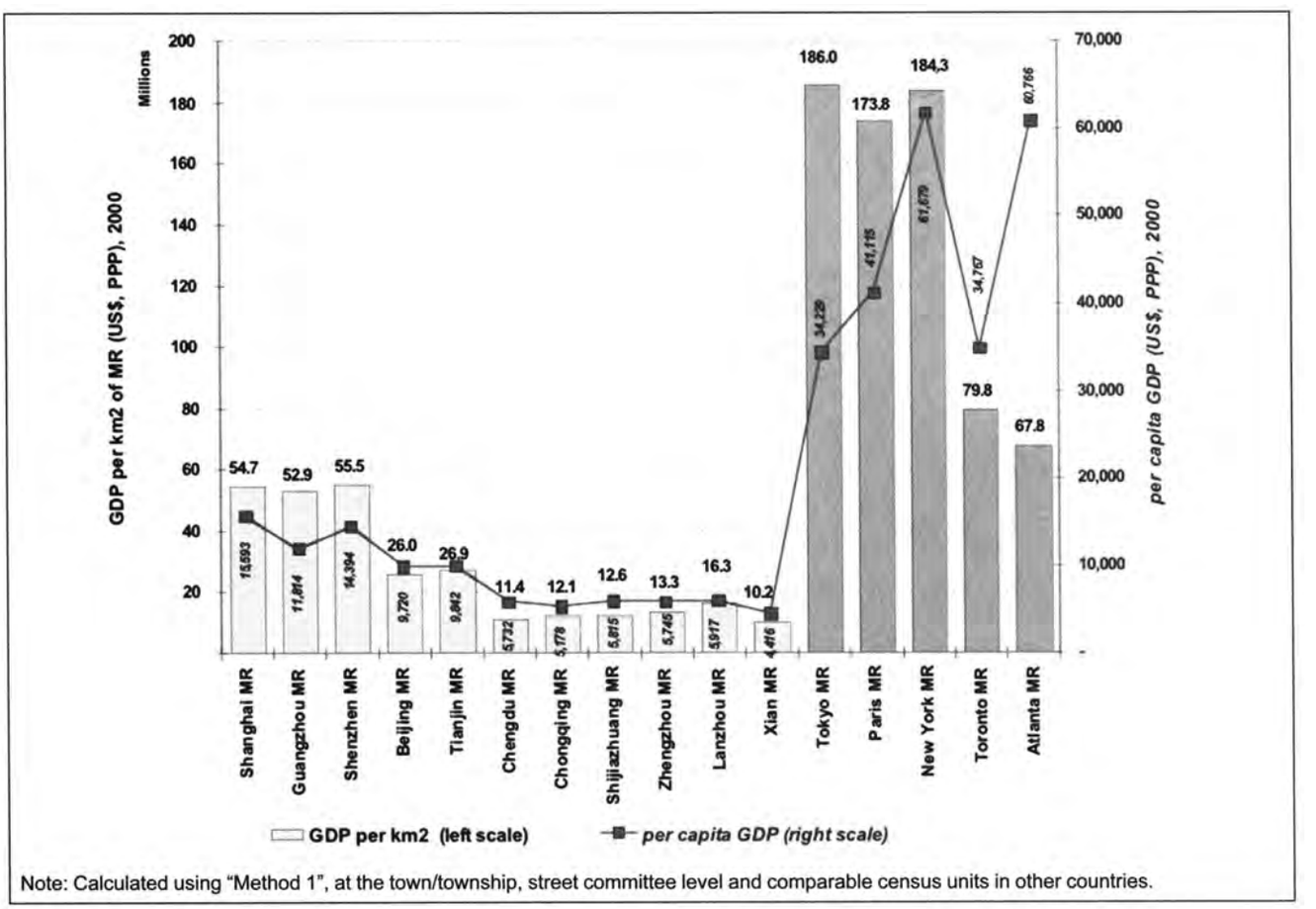
Current public policy in China is to promote urbanization in all towns (especially county seats) and small cities, regardless of their competitiveness and economic sustainability. From the central government's perspective, it cannot be perceived to be picking winners. This is also true at the municipal level, but local governments often go one step further and build new towns as special districts so as not to favor one town over another, thereby adding to spatial dispersion that undermines urbanization economies. This undifferentiated policy avoids difficult decisions and could, over time, actually undermine the urbanization process.

To maximize agglomeration benefits, governments need to promote urbanization in strategic smaller cities and towns within Metropolitan Regions, and not only to their central areas and outer cores. Governments need to set priorities among a few smaller, strategic cities and towns that have the strongest potentials for supporting the formation of new firms, attracting enterprises from outside the region, creating employment, and integrating into regional labor markets and supply chains. This needs to be done on the basis of objective analysis of the metropolitan region's economy as a whole – a particularly difficult challenge given that, for a variety of reasons associated with property rights, municipal government compete fiercely in China for inward investment.

Efficient and effective development of metropolitan regions in China also depends in large part on the removal of constraints to town-based urbanization. The promotion of urbanization in strategic towns and smaller cities in metropolitan regions will require continuing efforts to remove the constraints to migration posed by:

- labor mobility restrictions still pervading from the hukou household registration system;
- shortage of affordable housing for migrants in suburban towns and their often uncertain tenure;
- limited access to and inconsistent availability of affordable social services at acceptable standards, especially education and health;
- lack of access to at least a basic level of social security; and,
- in some areas, formal and informal constraints to migrants entering the town-based labor market.

Constraints to in-situ urbanization also need to be removed, particularly the arbitrary and often inadequate compensation paid



Note: Calculated using "Method 1", at the town/township, street committee level and comparable census units in other countries.

Fig. 12: Productivity of selected metropolitan regions, 2000.

by town governments to farmers for conversion of their land to urban uses (creating the new non zhuan fei population of "landless farmers" who are no longer farming, but are not provided the means for integrating into urban/suburban non-farming labor markets), the absence of training mechanisms to support the transition of these farmers to non-farming occupations, and, in bigger towns and those now within suburban districts, the limited access to affordable public services that are available to more established "urban" neighbors.

Improving production and innovation capacities

All city and town governments in China need to be concerned with increasing their firms' productivity to become and remain competitive. However, given that China's 53 metropolitan regions contribute two-thirds of the country's non-farming GDP, productivity improvements in their urban and suburban areas are essential if national economic growth is to be sustained.

China's metropolitan regions have far lower levels of labor and spatial productivity than those in more advanced economies (fig. 12). Furthermore, there appear to be three distinct levels of MR productivity, the highest being in Shanghai, Guangzhou and Shenzhen, followed by Beijing and Tianjin (at about half the productivity levels), and then what appears to be a consistent third level of remaining MRs, at about half the levels of Beijing and Tianjin.

Few cities, including in China, have sufficient capacities for all forms of production. If market and regulatory conditions allow, firms use a location's comparative advantages to create competitive advantages. Cities and metropolitan regions, therefore, tend to specialize in their production capacities, especially in market economies.

A key issue raised by municipal governments has been defining local productive sectors that could become competitive and, hence, which production capacities need to be improved. Under the central planning model, this was not an issue: central planners decided on the roles of cities in supply chains, and allocated what, in their view, were the resources needed to support production capacities to fulfill these roles. In the transition to a market economy, there is considerable uncertainty at local levels in China over what a city's new roles in supply chains should become. This frequently leads to misallocation of resources in supporting inappropriate capacities, and to rising opportunity costs. For example, almost every city now has a "high-tech area" or zone (many are virtually empty), and most municipal governments declare some form of "high-tech manufacturing" to be a "pillar" industry. However, there are very few cities in China (or, for that matter, in the Americas, Europe or Japan) with sufficient production capacities and competitive advantages in real "high technology."

In fact, capacities to manufacture competitively are also limited: not all cities in China are, should be, or could become significant manufacturing centers. The Yangtze Delta, comprising Shanghai, Jiangsu and Zhejiang Provinces, produced 23.4 percent of China industrial value added in 2000; Guangdong Province (largely the Pearl River Delta) contributed 13 percent, Shandong 9.7 percent, and the Beijing-Tianjin corridor 5 percent (fig. 13). Together these four regions therefore created 51 percent of China's industrial value added. China's industrial con-

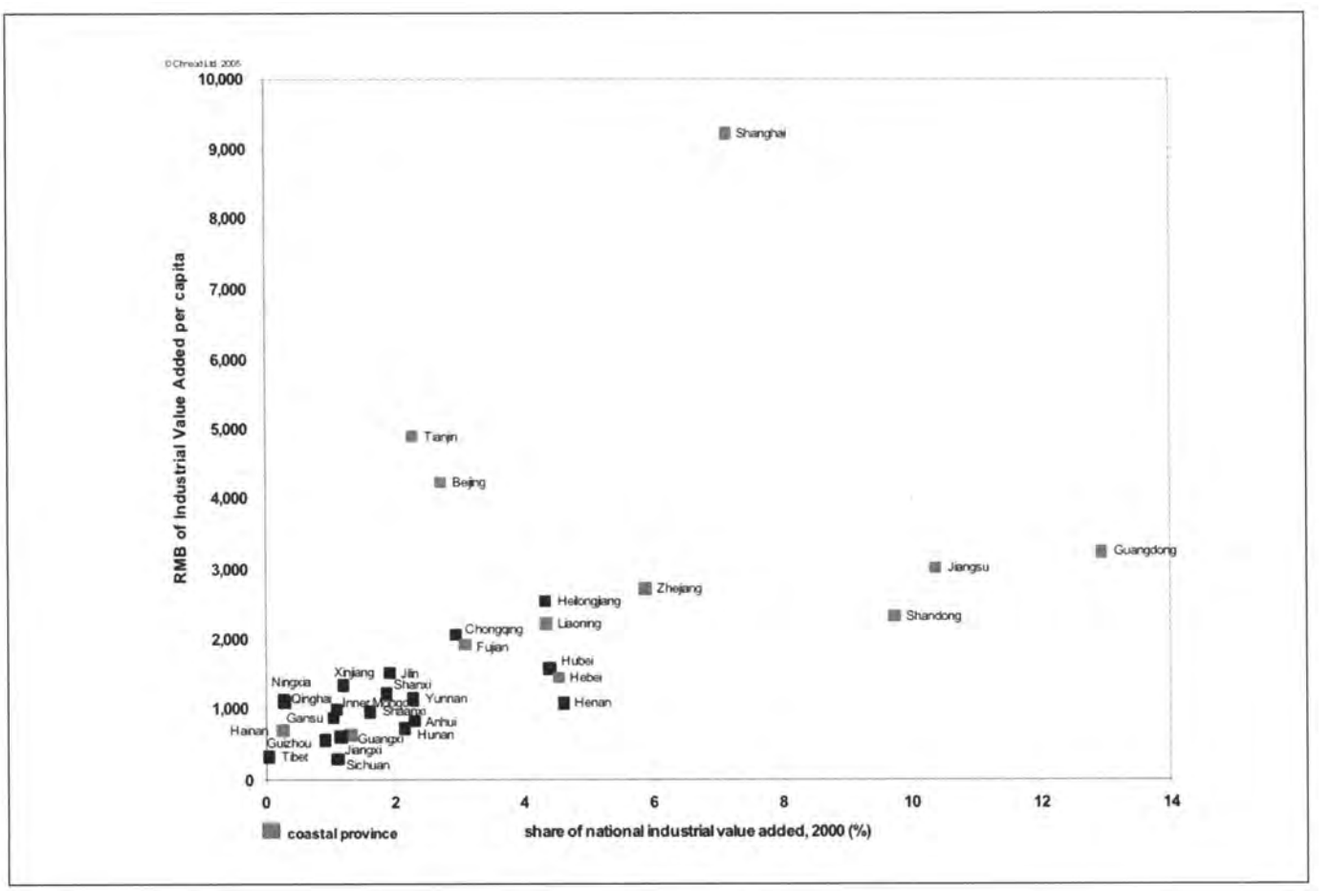


Fig. 13: Industrial productivity of provinces, 2000. (*Source:* Calculated from Jiang (2001), tables 6, 9 and 11).

centration is further illustrated in the map on figure 14 that shows the proportion of county and city workforces employed in manufacturing in 2000. Fully one-quarter of China's manufacturing workforce is located in the Yangtze Delta Region (18.6 percent) and the Pearl River Delta Region (17.0 percent). The Beijing-Tianjin Corridor holds only 3.3 percent. On a per capita basis, there is a 32-fold difference between provinces in industrial value added.

The higher value-added industrial outputs in some provinces reflect a combination of factors including: degree of industrialization and the role that industry plays in provincial economies; history of industrial activity and resulting path dependencies; access to export distribution hubs; current and recent regulatory environments affecting new, primarily foreign investment (such as designation of Special Economic Zones in the 1980s and early 1990s); factor endowments; innovation capacities; and total production costs relative to competing regional locations outside of China. Clearly, there are large differences in each of these factors among China's provinces and its 53 metropolitan regions of which governments need to be very aware. Not every metropolitan region – in any country – can do everything. Local governments need to take the lead in identifying, with other key economic stakeholders, realistic, attainable roles that their metropolitan regions can play in domestic and global supply chains.

The core production capacity of metropolitan regions around the world is their human capital. There are wide variations among China's cities in the levels of skilled workers. China's education system was severely affected during the Cultural Revolution when most schools and universities were shut down, creating a generation with comparatively weak educational attainment. This generation, now 45-60 years old, is absorbing the brunt of unemployment caused by SOE downsizing and closures since workers simply do not have the skills to apply to new jobs. In parallel, the historical disparities between urban and county/township level education continue, and very few rural or semi-rural students progress beyond the mandatory junior school level.

The results are huge differences in educational attainment across China's 658 cities (fig. 15). Two conditions are particularly significant. CLCs (which account for 438 of China's 658 cities) have extremely low rates of vocational attainment, and virtually no graduate-level attainment. This has serious implications for their levels of productivity and innovation, both of which are becoming important determinants of a city's national and global competitiveness. While most Prefecture-level Cities (PLCs) have a significant stock of vocational graduates, there is almost a ten-fold difference in levels between the lowest and highest ranked cities. Again, this suggests significant differences in labor productivity and capacity to assimilate new technologies. Also of concern, however, is the wide range among PLCs in residents with graduate degrees as a proportion of the city population. The human capital to exercise advanced functions in research, marketing and management are in short supply in many areas.

A central theme of recent regional and urban development policy in Europe and North America has been the importance of innovation.[13] Considerable research in many industrialized countries has shown a strong link between innovation and productiv-

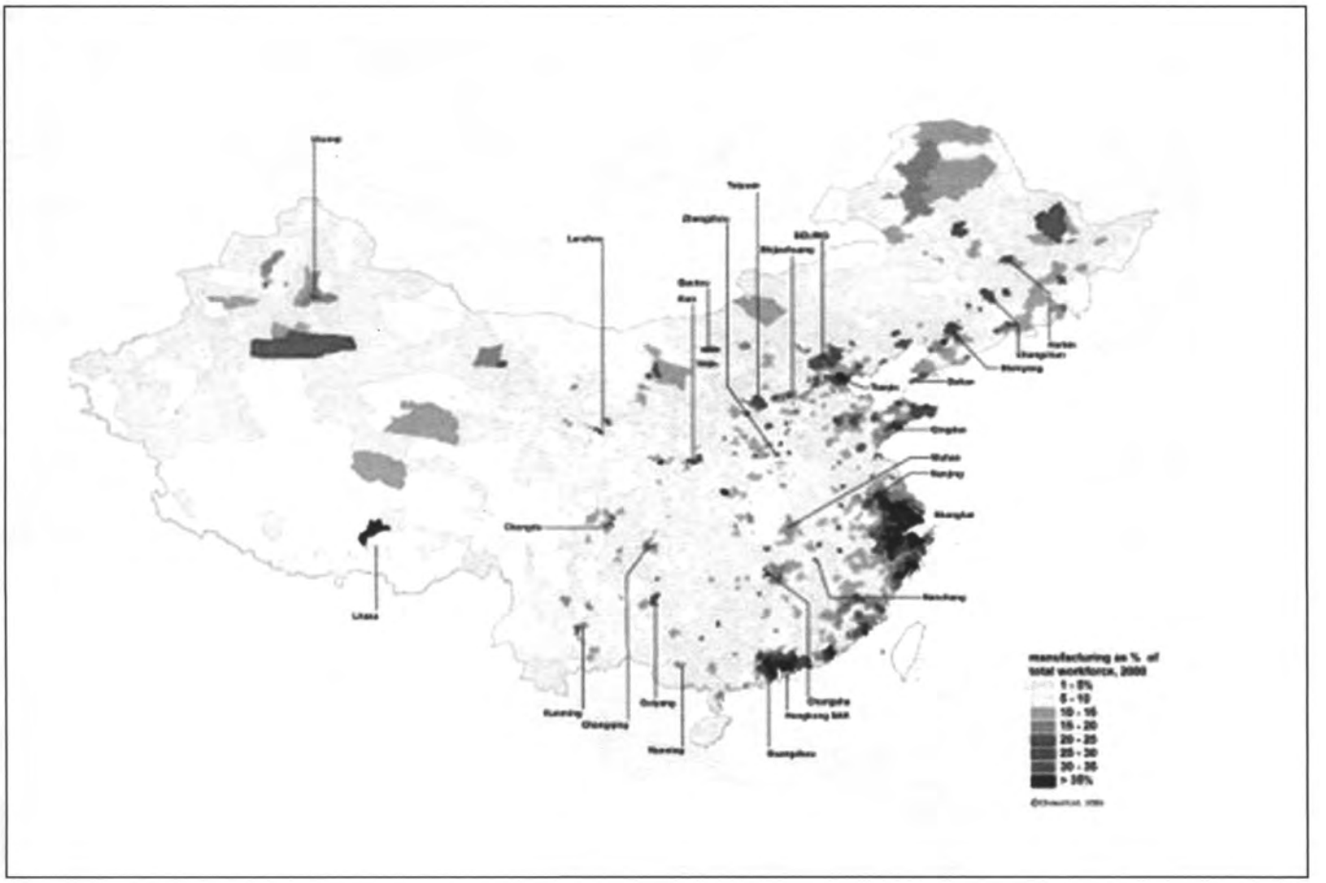


Fig. 14: Distribution of manufacturing workforce in counties and cities, 2000. (*Source:* Chreod Ltd calculation from *2000 National Census*).

ity of firms, and hence the competitiveness of areas in the context of a globalizing economy. Innovation capacities are essential to the continued profitability of firms for the simple reason that someone, somewhere is developing the same or similar products, services or distribution systems that meet customer needs at a lower price, or that respond to future market needs that are not yet obvious to competitors. Those metropolitan regions that foster innovation and its commercialization are likely to become China's leading producers and to be more quickly integrated into higher value-added global supply chains.

Compared to Europe and North America, there has been comparatively little research conducted on innovation capacities in China. There are few comprehensive policies in China specifically targeted towards fostering innovation (beyond some general provisions for "promoting science and technology"). There appear to be three distinct, but incomplete, innovation systems in China:

- The first is lodged vertically in government through research institutes and enterprises that rarely disseminate knowledge, even tacitly, to other organs of government, to universities, or to non-state enterprises.[14]
- The second lies within domestic firms, either quasi-public, State-owned corporations or private companies. While most do not conduct formalized R+D, significant accumulation and distillation of knowledge is acquired informally from other cities in China and overseas through study tours and conferences, and more formally through licensing of advanced technologies and hiring of graduates, including those returning from abroad.[15]
- The third is within foreign-invested enterprises, either joint ventures or wholly foreign-owned firms in a growing number of sectors.

China has explicitly linked direct foreign investment (DFI) to technology upgrading over the last 15 years. The assumption is that foreign firms will transfer improved technologies, and strengthen local innovation capacity through which spin-off technologies will emerge. While parts of China have been successful in attracting foreign firms that have served this policy goal, much of the DFI that is occurring in low value-added manufacturing, real estate, and infrastructure has little technology content, or the technology that is being transferred is third or fourth generation and beginning to degrade, at least for production geared towards more advanced domestic and export markets.[16] While these mature technologies certainly serve the purpose of upgrading many of the antiquated technological processes in China, they do not necessarily provide the springboard for strong and consistent technological upgrading, particularly if improvements to local human capital do not come with the transferred technology.[17]

The spillover effects of direct foreign investment (DFI) in China

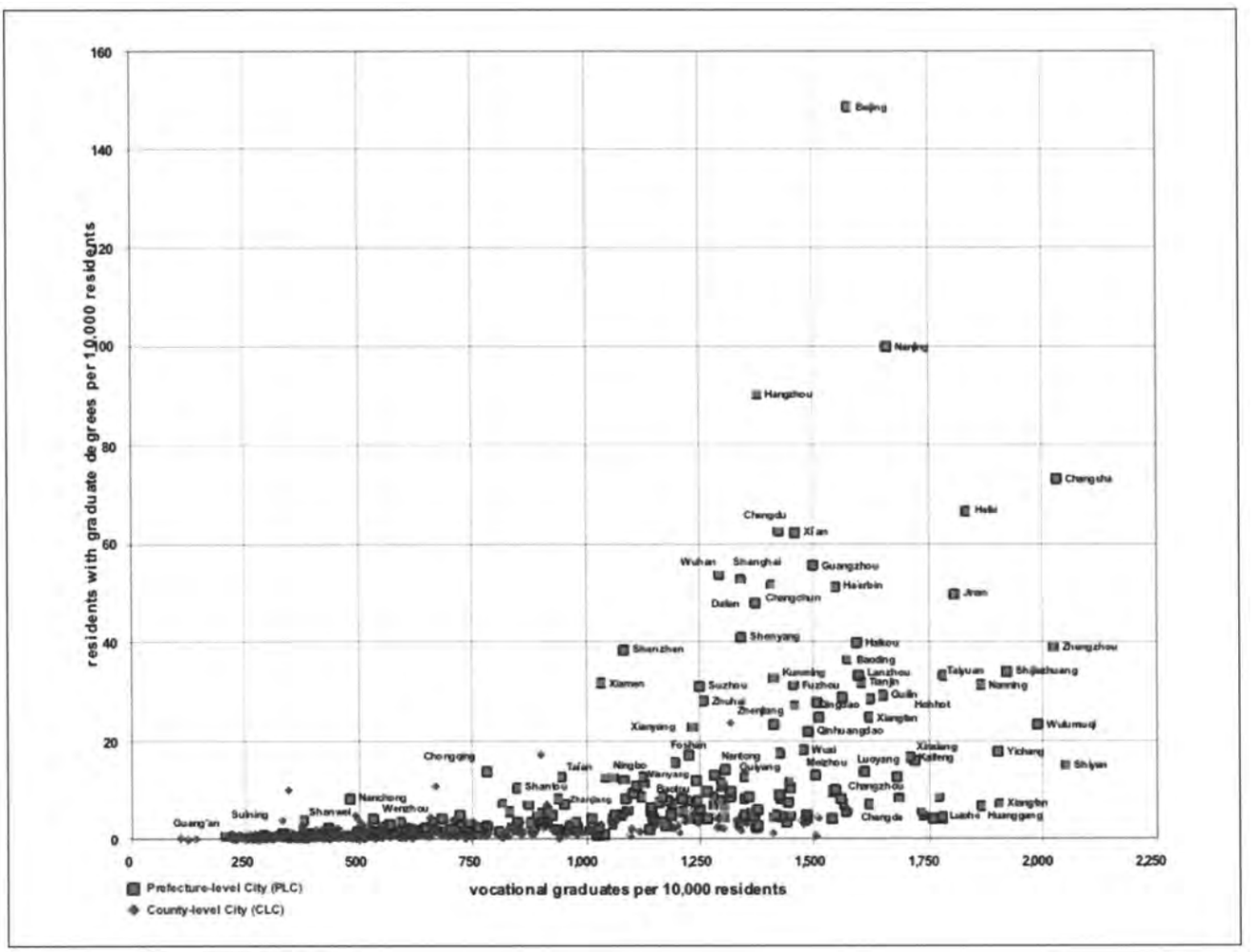


Fig. 15: Wide divergence in educational attainment in China's cities, 2000. (*Source:* Chreod Ltd calculations from *2000 National Census).*

are mixed, depending on the country of origin and the targeted sector for investment. DFI has been concentrated in selected coastal locations for many years to a very few of China's 53 metropolitan regions (fig. 16). The value added to manufacturing of this spatially concentrated DFI varies widely (fig. 17). While DFI has improved productivity in some areas, in many sectors it has not yet become the engine of innovation that government has expected.

While there are likely a host of reasons (including language and intellectual property protection), the reluctance of foreign companies from industrialized countries to transfer advanced technology and management practices is partly due to human capital in most of China's metropolitan regions. Educational attainment is likely to be the single most important constraint to fostering innovation capacities in China's cities over the next generation. The graph on figure 18 shows the difference between university attainment in China's cities (24 top ranked metropolitan regions are shown on the graph) and selected North American metropolitan regions. This could explain, at least in part, why foreign investors have so far generally resisted locating high value-added manufacturing and advanced services in China, preferring instead to keep these in locations where sustained access to highly-educated human capital is more assured. It also explains, in part, China's generally weaker indigenous innovation capacities.

Although university enrolment has increased considerably in the last five years, the delivery cycle for highly-trained technical and professional graduates is 6-10 years, and there is not likely to be a major upsurge in potential employees at least for another five years. But local governments need to recognize that a combination of new graduates and a reported increase in Chinese graduates returning from overseas institutions represent a potentially important addition to the human capital and innovation capacities of their metropolitan regions. Given increased labor mobility in China over the past few years, and growing competition among metropolitan regions to attract highly-qualified graduates, most of this segment of the workforce will be able move to where career opportunities are highest.

Broadening agglomeration benefits to vulnerable populations

There appear to be six major groups of vulnerable populations in many of China's metropolitan regions:

- laid-off and unemployed urban workers;
- newly-graduated students looking for work;

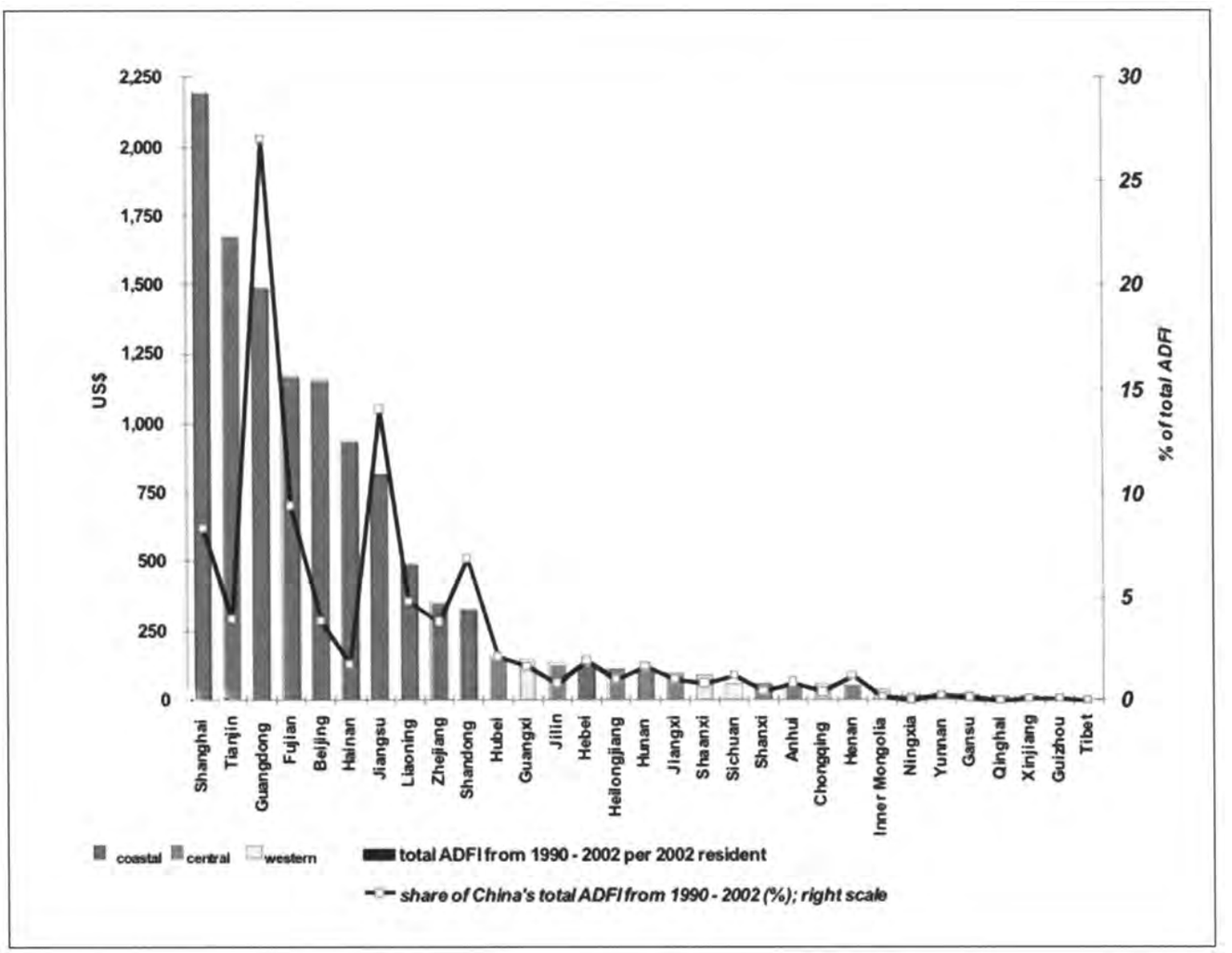


Fig. 16: Provincial performance in attracting foreign investment, 1990-2002. (*Source:* Calculated from 2003, 1996 *China Statistical Yearbooks*).

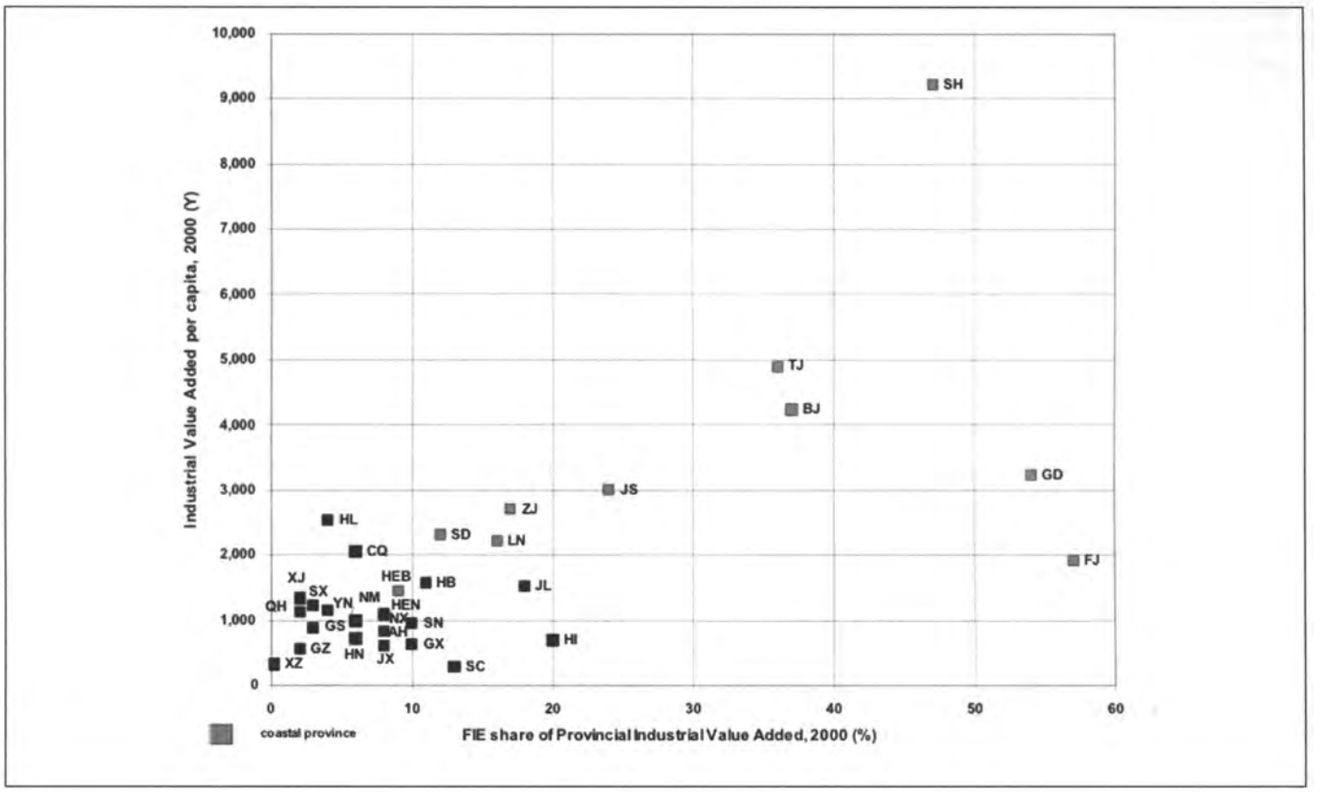


Fig. 17: Influence of foreign investment in adding value to China's manufacturing. (*Source:* Calculated from Jiang, 2001, Tables 6, 9 and 11).

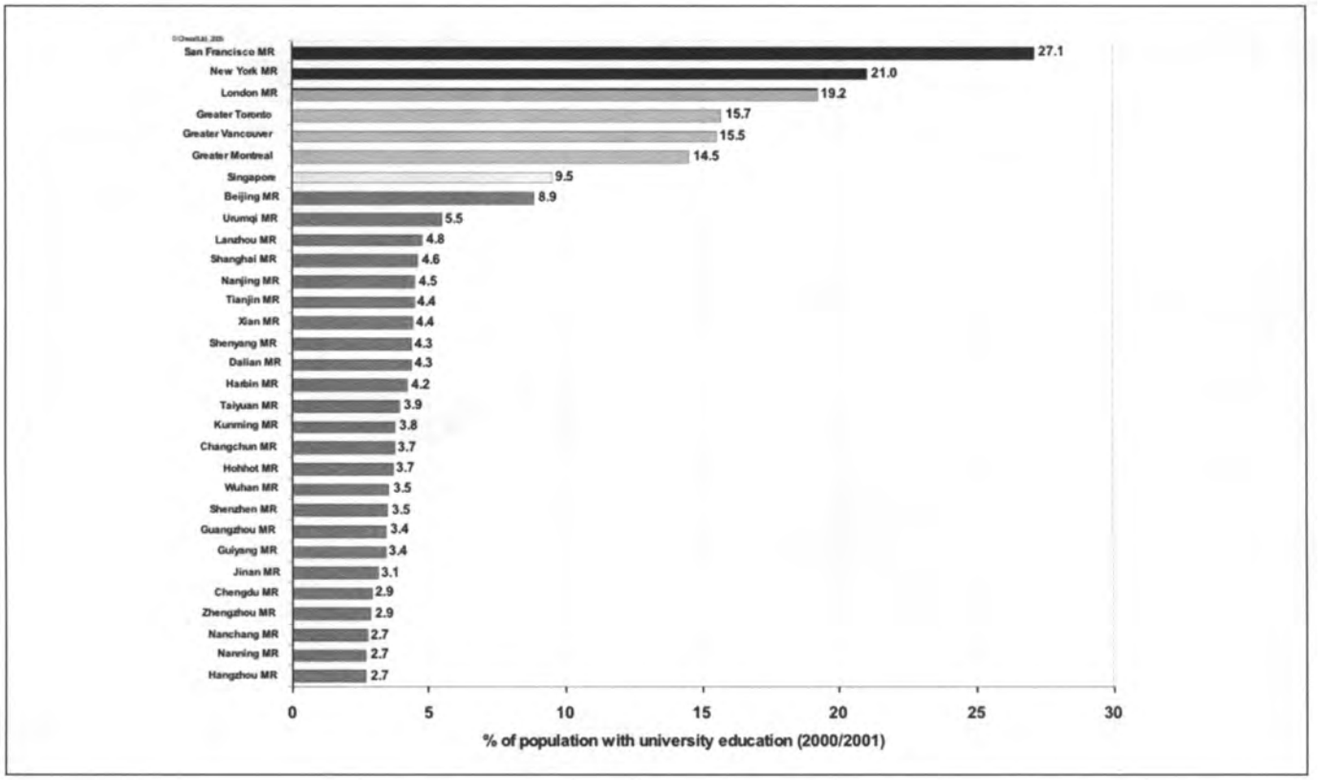


Fig. 18: Percent of metropolitan region population with university education, 2000/2001. (*Source:* For China, *2000 National Census of China* data; for Singapore, *2000 Population Census*; for Canada, *2001 Census*; for USA, *2000 Census*).

- the chronically "old poor" who are under the support of civil affairs bureaux;
- migrant workers and, increasingly, their families;
- "landless farmers" in suburban areas; and,
- over the longer term, a significantly expanded cohort of the elderly.

Local governments are largely coming to terms with their responsibilities for the first three vulnerable groups, but significant attention has yet to be paid to the needs of migrants, "landless farmers," and the aging population, all of whom are distributed far more widely across metropolitan regions.

There is a widespread impression that China's rural migrants are streaming to the coast, looking for work in the Pearl River and Yangtze River Deltas, and in the Beijing-Tianjin Corridor. According to the National Census, there were 75 million migrants in China's 53 metropolitan regions in the year 2000; they accounted for 51 percent of China's total migrants. But the two Deltas and the Beijing-Tianjin Corridor only accounted for 41 million migrants, or 28 percent of China's total of 147 million migrants that year and 54 percent of migrants in the country's 53 metropolitan regions. While there are certainly high concentrations in the two Deltas and in Beijing, rural migration is occurring throughout the country to cities of all sizes – with just over half to China's metropolitan regions (fig. 19). Not surprisingly, a larger proportion of migrants to metropolitan regions are attracted to those cities with higher levels of urbanization (fig. 20). This is significant, since migrants in China generally move on the basis of employment information gathered from family and other informal networks. Migration is a relatively good indicator of real employment opportunities.

Rural migrants lack affordable access to good housing, safe and secure employment, and are rarely included in any formalized social welfare system. Although it is now being gradually addressed, the household registration system has impeded the free flow of labor into the formal employment sector. However, the dynamism inherent in a more flexible labor market has been evidenced by migrant workers making substantial contributions to metropolitan regional economies with unemployment generally at much lower rates than for registered urban residents. In some cities, as much as 80 percent of the retail service sector is occupied by migrant labor. Such success is especially laudable in view of migrants' insecure legal status, and institutional barriers to their employment, schooling and social welfare provisions.

Urban welfare systems and rural land arrangements are the main institutional barriers to labor mobility. High costs of childcare and schooling also hinder rural families migrating to the urban areas. Because of institutionalized discrimination against migrants, they have traditionally borne heavier costs for healthcare and education. Responses by the migrant community to organize "informal" schools (offering reduced tuition rates) for their children has created a two-tiered educational system, excluding migrant children from mainstream educational opportunities. Housing costs in urban areas are also an important barrier. These existing barriers increase the migration cost, and dampen flows to cities and suburban areas.

Migrants are not only becoming an issue in central cities. While the highest numbers and densities of migrants are found in the cores of metropolitan regions, high concentrations are also found in selected suburban towns (fig. 21). Responding to social needs of migrants is, therefore, becoming a growing issue for town governments, not only for the municipal government in the core metropolis.

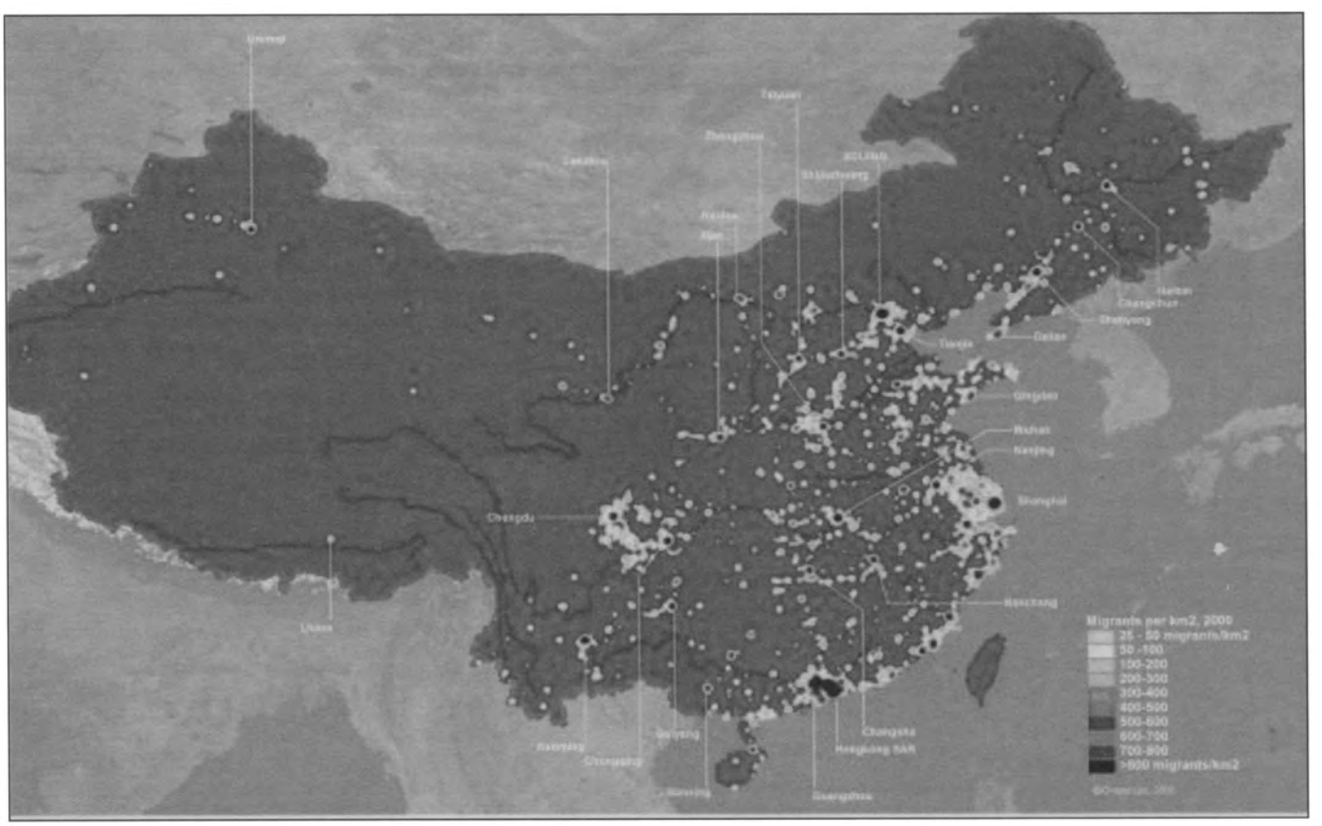


Fig. 19: Distribution of migrants: Migrants per sq.km, 2000. (*Source:* Chreod Ltd calculations from *2000 National Census*).

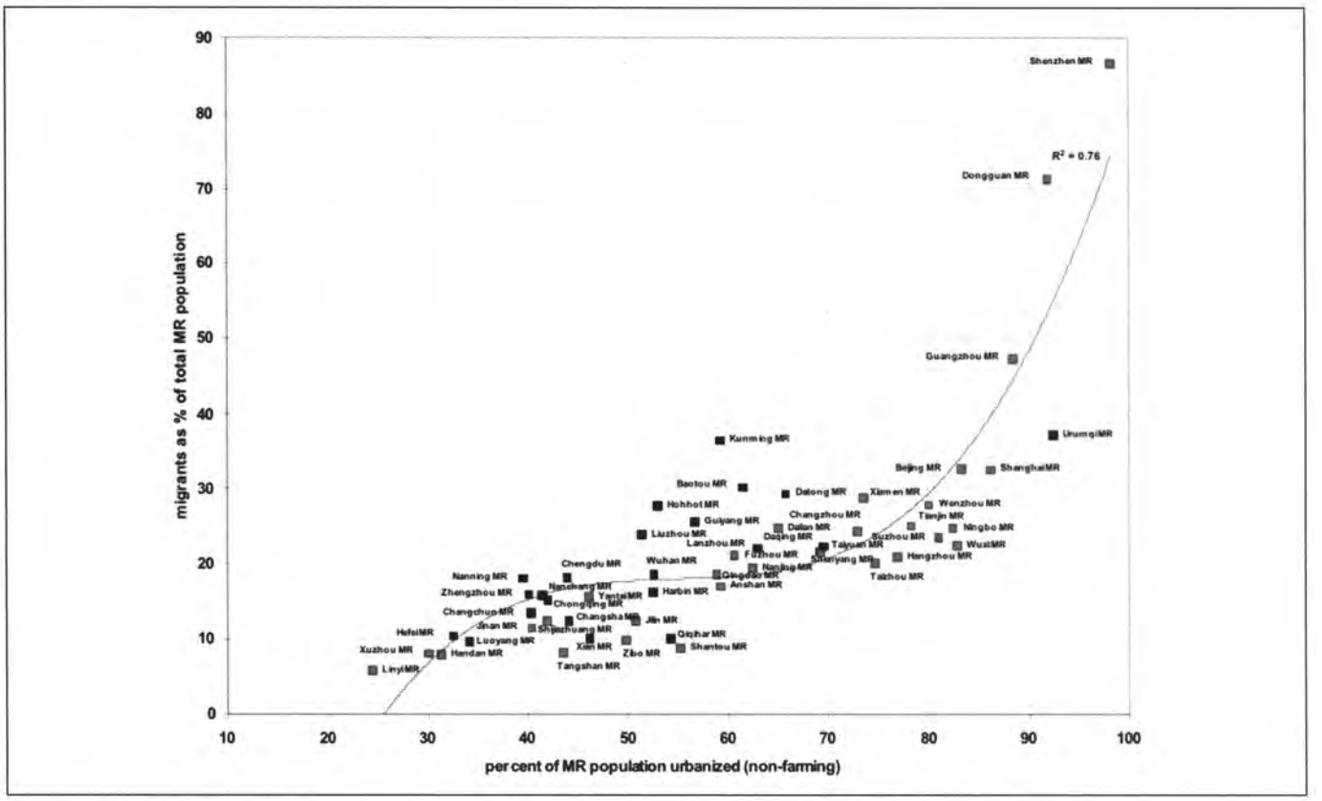


Fig. 20: Migrants are attracted to more urbanized metropolitan regions (2000).

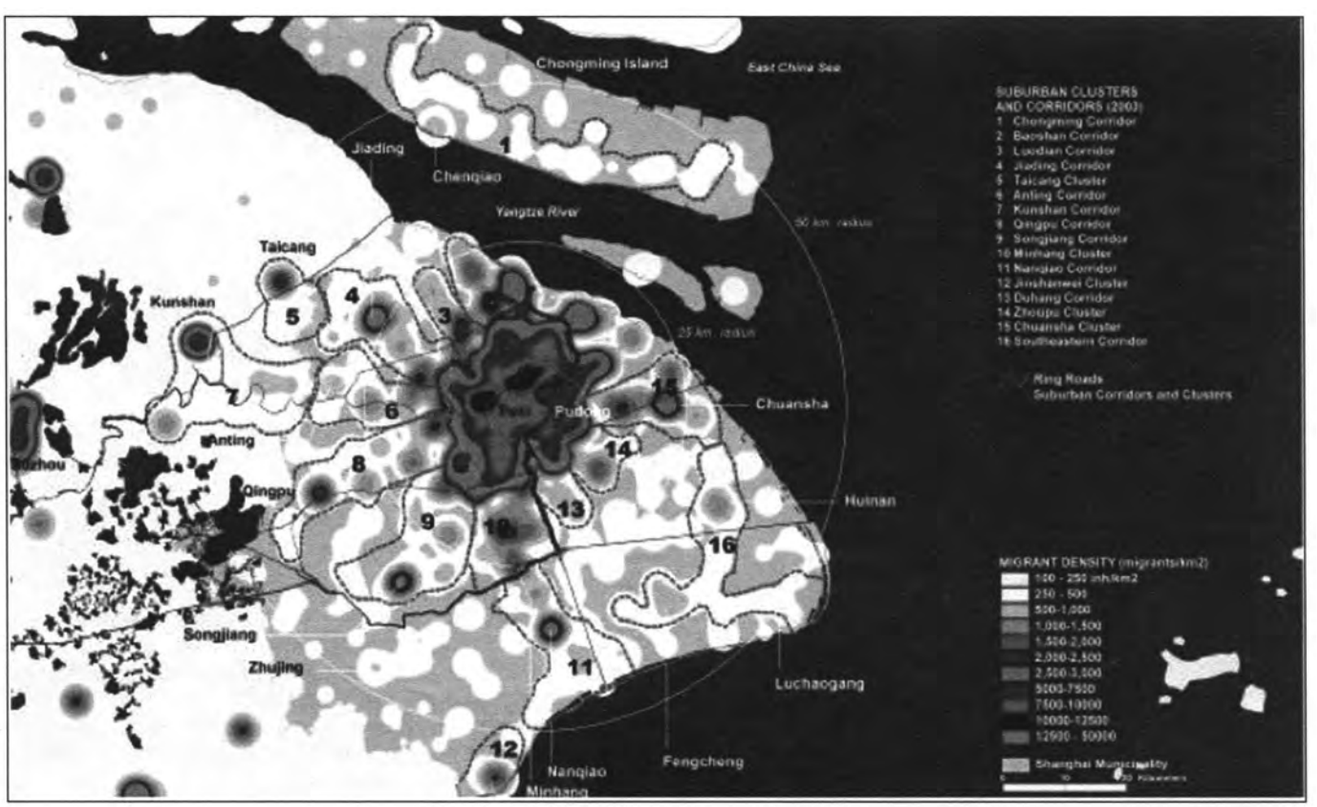


Fig. 21: Density of migrants in Shanghai metropolitan region, 2000 (migrants/sq.km). (*Source:* Chreod Ltd calculations from town, township, and *Street Committee Census 2000* data).

Suburban concentrations are directly related to employment locations: they are more dispersed in larger and more rapidly-expanding metropolitan regions such as Shanghai. Of all types of metropolitan residents, suburban migrants face the greatest constraints to employment choices because of their limited physical access across metropolitan regions, most of which have, at best, very rudimentary forms of regional public transport.

The relatively new social phenomenon of "landless farmers" is also likely to become a growing challenge to town and suburban district governments in metropolitan regions. At the end of 2003, there were reportedly 20 million such households in and around China's cities, representing a population probably approaching 80 million. While the central government's recent crackdown on unauthorized conversions of agricultural land to urban construction will dampen growth of the number of landless farmers in the short term, in the medium and long terms, such conversion will need to continue to accommodate land requirements of expanding metropolitan populations and enterprises.

A recurrent issue raised recently in many cities is the low level of compensation paid to farmers for forsaking their rights to landholdings. Aside from expropriation for infrastructure needs (such as roads), the principal method of land conversion is for town governments to purchase rights from farming households to assemble tracts of land that can then be marketed as industrial parks or sold to commercial developers for new residential and recreational uses. In some cities, there is a 30-fold spread between what is paid to farmers and the selling price of assembled and semi-serviced land. Many local governments are facing considerable pressure from landless farmers to retroactively increase compensation to approach what is perceived to be fair market value.

The challenge of integrating landless farmers into the labor force and social systems of metropolitan regions is similar to the situation with rural migrants. Unlike for migrants, the children of landless farmers already have access to formal education, and households often retain their homes. However, with their minimal incomes, costs of education are reportedly becoming onerous and measures need to be found to ensure that children will continue to have access as parents acquire urban skills and jobs. In addition, the principal needs for landless farmers are training in non-farming employment skills and improved, affordable transport access to employment opportunities.

Directing urban and suburban growth

The spatial structure of metropolitan regional growth in China over the last two decades has differed considerably from the pattern in North American and some European cities over the last century. The latter have traditionally grown outwards in a centrifugal way with large influxes of migrants (from the countryside, from other cities, and from other countries) accompanied by large-scale suburbanization as many sitting residents relocated from inner city areas. In China, households and enterprises face numerous constraints to mobility into (and out of) inner urban areas that severely limit locational choices. Aside from hukou (mandatory registration at birth as either an agricultural or non-agricultural resident), which limits labor mobility, the dominant enterprise structure of vertically-integrated SOEs means that many supply chains are extremely localized within cities. Inner city land and housing tenure also affect mobility. Heavy subsidization of residential units by state-owned and government work units in urban areas has only recently been discontinued, and secondary markets in formerly state-owned residential units are slowly emerging. The decades-old administrative allocation of inner urban land to state-controlled enterprises at no cost means that, up until very recently, there has been no economic incentive for these firms to relocate to lower-cost suburban sites.

In suburban areas where arable land is collectively-owned and far less regulated, informal shifts from farming to small-scale industrial production have been relatively simple, particularly when firms are owned, at least in part, by town/township and village administrations. Similarly, residential and labor mobility among rural residents in suburban areas, including from other towns and townships, are less constrained. Residential growth in many suburban towns and villages is supported by informal rental markets that have evolved over the last 15 years. Therefore, while household mobility and enterprise formation have been tightly constrained within inner urban areas over the last two decades, under market reforms the reverse has been true in suburban towns, townships and their constituent villages.

The growth of metropolitan regions in China, at least over the past 15 years, has largely been centripetal, through locational decisions by households and firms that circumvent administrative constraints to residency, employment, enterprise formation and land tenure in urban districts (fig. 22). Given the population densities in suburban areas, and the relative ease of industrial enterprise formation, it has not taken much for farming areas on the outskirts of urban districts to rapidly transform into semi-formal suburban precincts. While this centripetal pattern of urban growth resembles some aspects of supposed "mega-urban" growth elsewhere in Asia, the underlying reasons for and characteristics of China's recent urban spatial transformation are unique to the administrative constraints imposed on property rights, the mobility of labor and capital, distribution systems, the

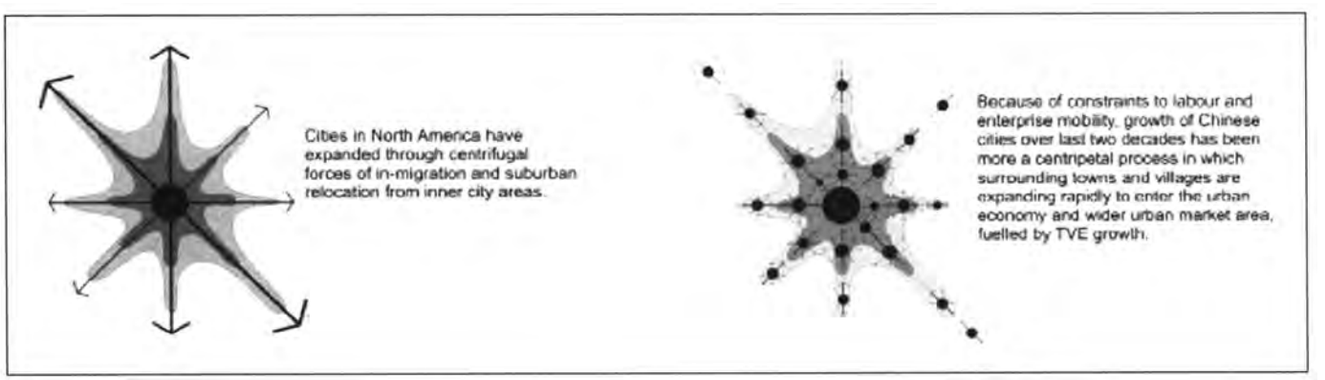


Fig. 22: Contrasting growth dynamics in metropolitan regions.

land market, and inter-jurisdictional trade. However, while most metropolitan regional growth in China over the last 20 years has been centripetal, centrifugal pressures are now building in many regions due to large influxes of migrants, industrial relocation from the central cores, new non-state investment in suburban industrial parks, and government efforts to reduce inner city residential densities by promoting relocation to suburban areas. Unlike in the past two decades, many metropolitan regions in China will face a complex mix of both centrifugal and centripetal growth pressures over the next 20 years.

The resulting spatial pattern of metropolitan regions in China is therefore a combination of high densities in central areas (generating attendant congestion and environmental costs), and very dispersed suburban areas which together undermine urbanization economies (figs. 23 to 26). There are numerous CLCs and towns in Chinese MRs that are all competing for inward investment and for spillover benefits from metropolitan economies. The capital and recurrent costs to adequately service these multiple sub-centers are often either unaffordable (and services are therefore not provided) or are very high and hence drive up costs to households and firms. In either case, urbanization economies do not accrue across the metropolitan region. This compares with spatial patterns in some highly-productive metropolitan regions outside of China, such as Paris and New York, where there

Fig. 23: Chengdu metropolitan region: 11.2 million residents (2000). (*Source:* Chreod Ltd using "Method 1" analysis of georeferenced Town, Township and Street Committee data from 2000 Census).

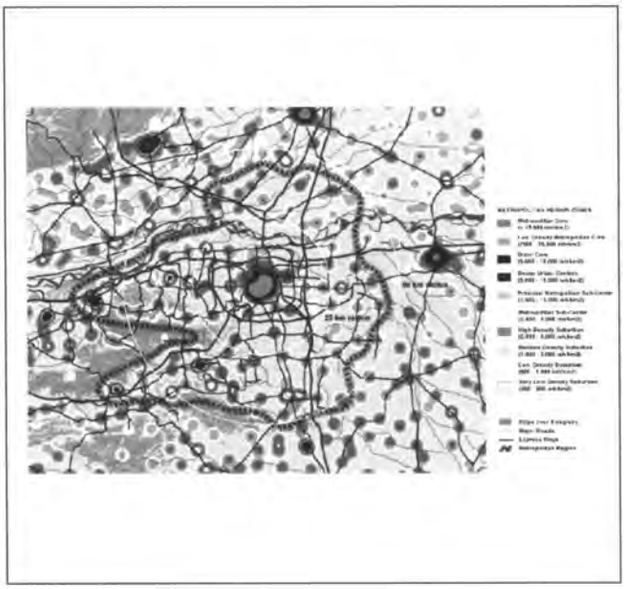


Fig. 25: Zhengzhou metropolitan region: 6.4 million residents (2000). (*Source:* Chreod Ltd using "Method 1" analysis of georeferenced Town, Township and Street Committee data from 2000 Census).

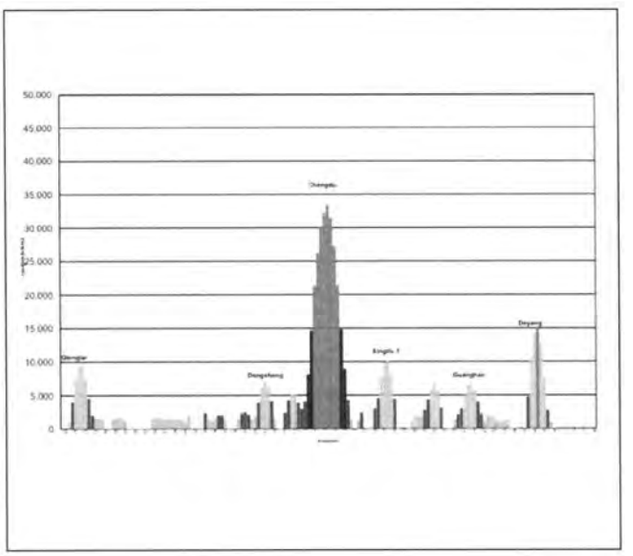


Fig. 24: Cross section of population densities in Chengdu metropolitan region (2000).

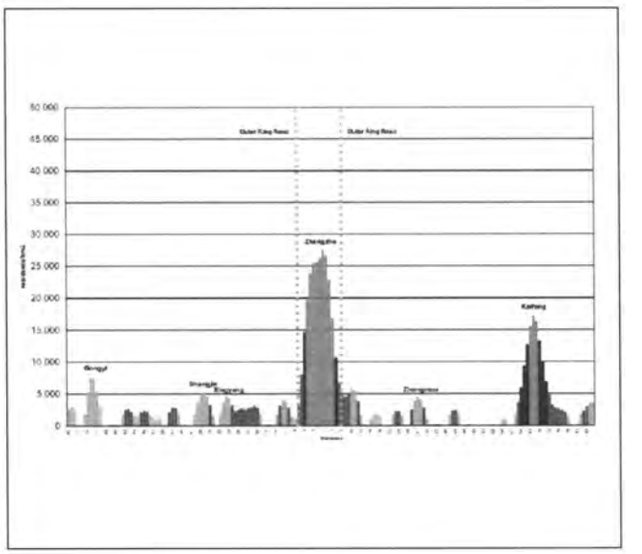


Fig. 26: Cross section of population densities in Zhengzhou metropolitan region (2000).

are lower central core densities and far fewer sub-centers (figs. 27 to 30).[18]

The comparatively high centrality of China's metropolitan regions is a direct result of two legacies: a long tradition in which the country's few cities predominantly played governmental and administrative rather than economic roles; and the central planning tradition favoring the development of rural areas and promotion of targeted industrialization within selected cities through strict controls on the formation and mobility of factor inputs, especially labor. Both traditions are now history, but the path dependencies are still manifested in very high central city densities, the proliferation of suburban towns (former market towns), and the comparatively low population densities within these towns.

However, with the dramatically increased mobility of factor inputs caused by market reforms over the last 20 years, many of China's metropolitan regions are beginning to expand rapidly through un-directed suburbanization. The result is consumption of agricultural land and growing urban sprawl that is causing inefficiencies in land use, land markets, goods transport, and public transport, all of which undermine agglomeration benefits. This is occurring not only in the major coastal metropolitan regions, such as Shanghai (fig. 31) and Guangzhou (fig. 32), but also inland in smaller regions such as Chengdu (fig. 33). Time-series analysis of satellite imagery[19] shows that built-up land areas in large parts of suburban Chengdu grew by 300 percent in a six-year period (1996-2002) and built-up parts of large areas of suburban Shanghai expanded by 350 percent from 1988 to 2002. Concerns over rampant conversion of agricultural land have triggered periodic inspections and local clampdowns by the Ministry of Natural Resources and Lands, but the basic problem for municipal governments continues to be actually knowing what is happening in suburban areas under the administration of outlying, relatively autonomous districts and town governments.

The form of suburban growth in metropolitan regions is calling into question the basic premises under which area urban development plans are being prepared in China's metropolitan regions. Most regions are developing through corridors of suburban development along major roads, and in smaller urban clusters an-

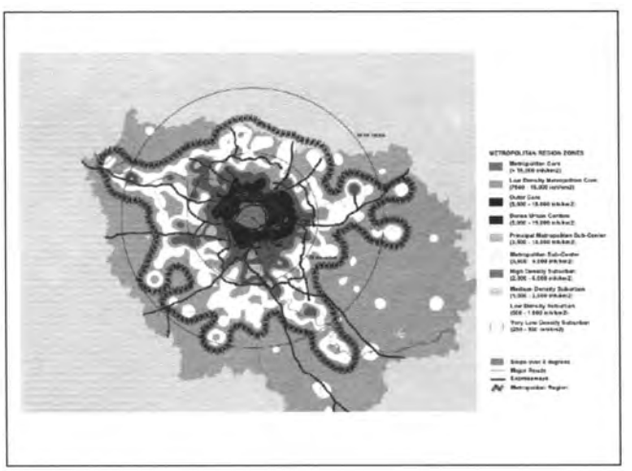


Fig. 27: Paris metropolitan region: 10.4 million residents (1999). (*Source:* Chreod Ltd using "Method 1" analysis of georeferenced data from 1999 Census).

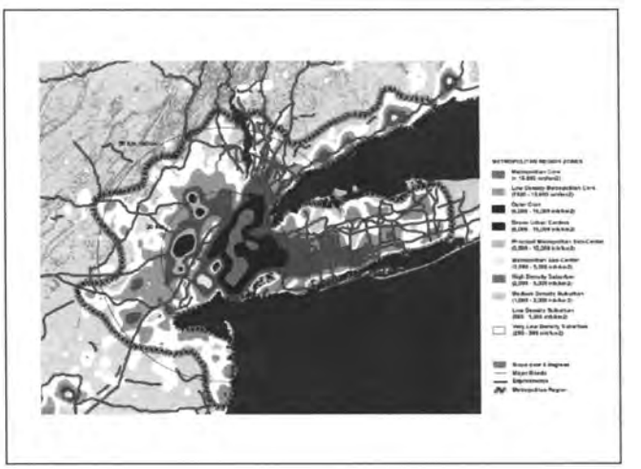


Fig. 29: New York metropolitan region: 16.2 million residents (2000). (*Source:* Chreod Ltd using "Method 1" analysis of georeferenced census tract data from 2000 Census).

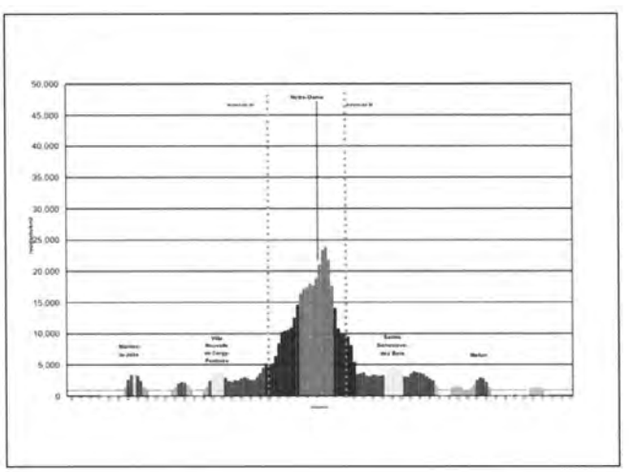


Fig. 28: Cross section of population densities in Paris metropolitan region (1999).

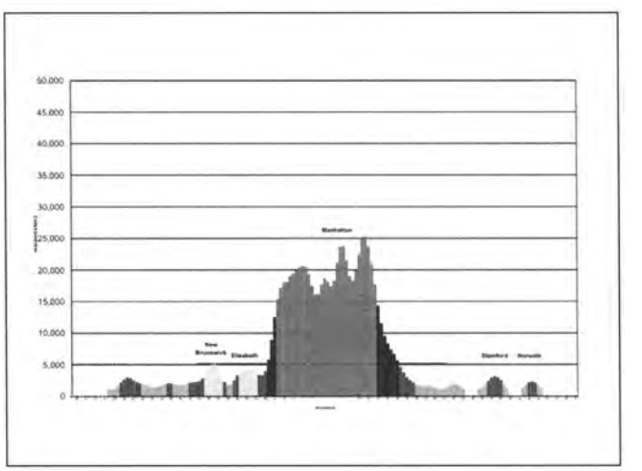


Fig. 30: Cross section of population densities in New York metropolitan region (2000).

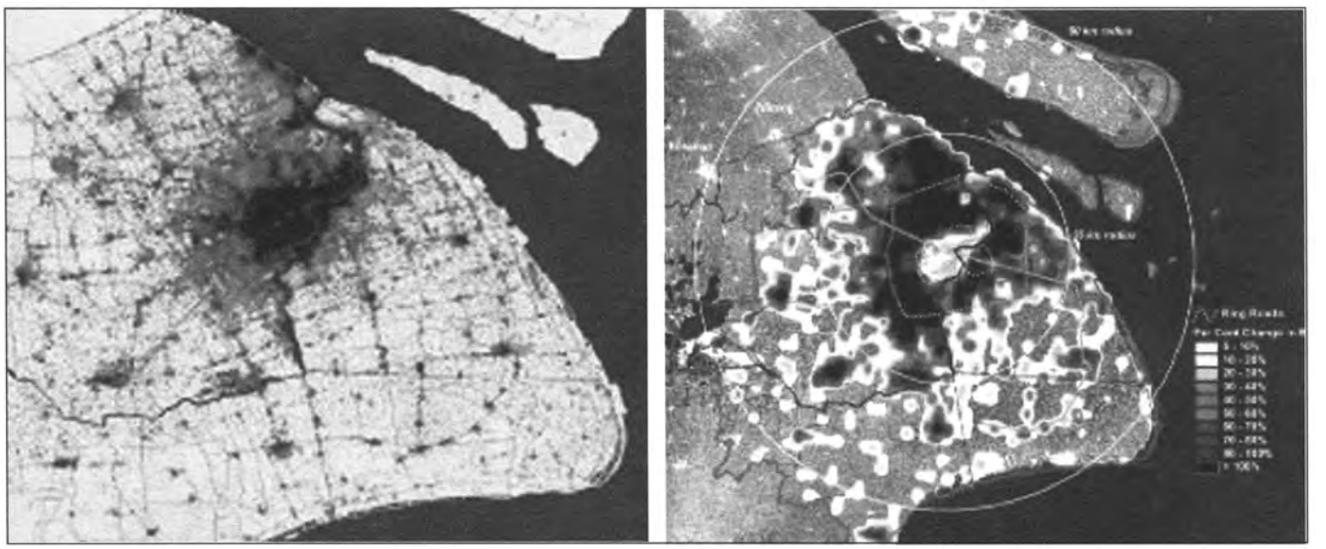


Fig. 31: Urban land use in Shanghai: 1988 and 2002; change intensity (right). (*Source:* Chreod Ltd).

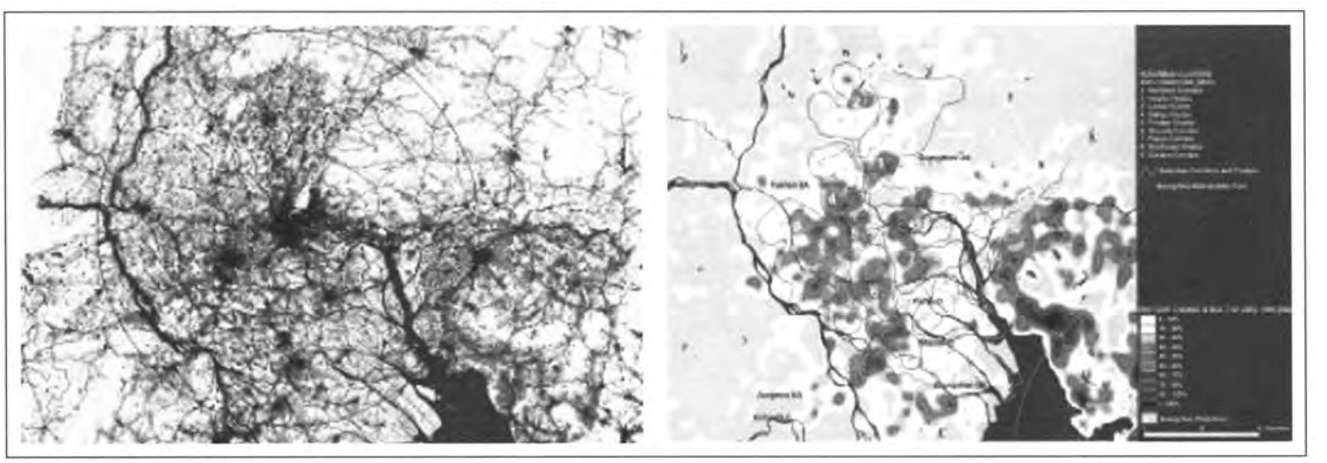


Fig. 32: Urban land use in Pearl River Delta: 1990 and 2000; change intensity (right). (*Source:* Chreod Ltd).

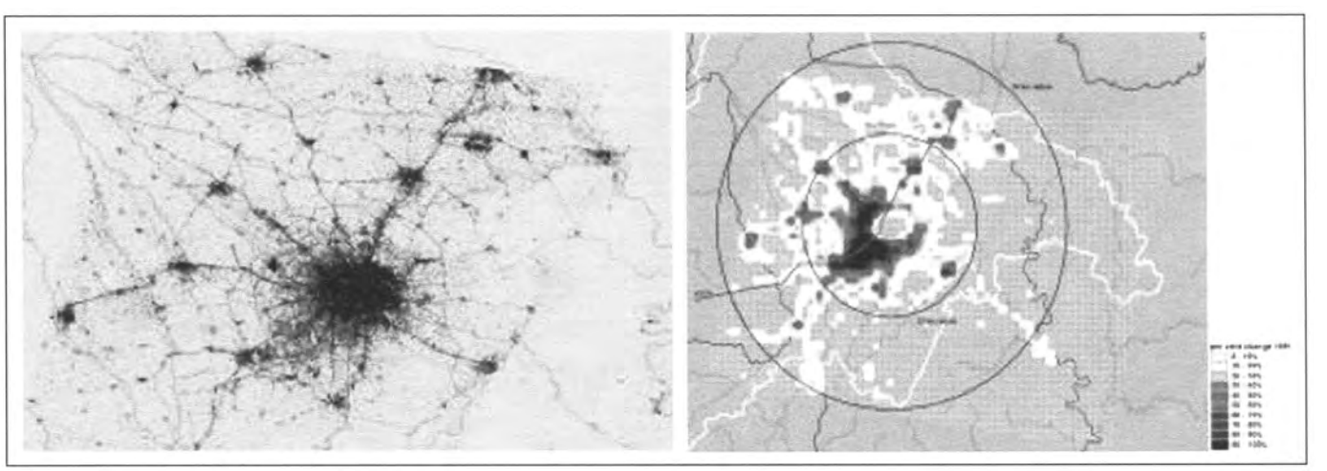


Fig. 33: Urban land use in Chengdu: 1991 and 2002; change intensity (right). (*Source:* Chreod Ltd from satellite data provided by Schneider et al., 2003).[19]

chored on suburban towns. This pattern of growth is occurring in metropolitan regions of all sizes, ranging from the largest (Shanghai and Guangzhou; figs. 34 and 35) to intermediate regions such as Chengdu (fig. 36) and even to small metropolitan regions such as Lanzhou (fig. 37). Corridors and clusters do not respect administrative boundaries, and invariably traverse municipal and sub-municipal jurisdictions.

There is a serious disconnect between urban and transportation planning in many of China's cities and the actual pattern of suburban development in corridors and clusters. China's planning approaches are still lodged in traditional monocentric and polycentric models: detailed plans are prepared for nodes that are connected through transportation networks to form a larger, ordered urban system – at least on paper. But disparate market forces take advantage of lower land costs (and often lower costs of regulatory compliance) in non-central areas and on the peripheries of nodes, resulting in the corridor and cluster pattern of urban development common to many metropolitan regions around the world. The example of Shanghai is instructive where the Master Plan to 2020, approved by State Council in 2000, has already been superseded by extensive suburbanization along corridors and in several large clusters – all of which were not anticipated in drawing up the Master Plan (figs. 38 and 39).

The population densities of central areas in many of China's

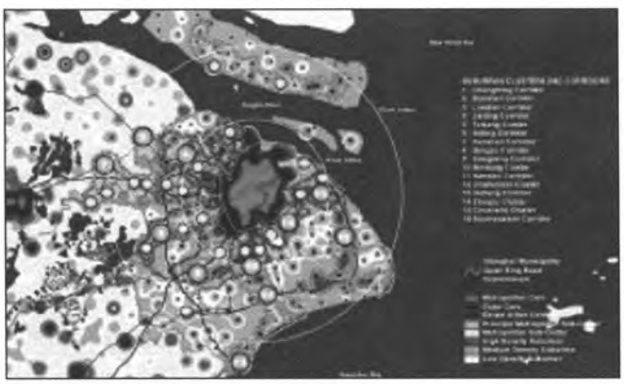


Fig. 34: Shanghai corridors and clusters.

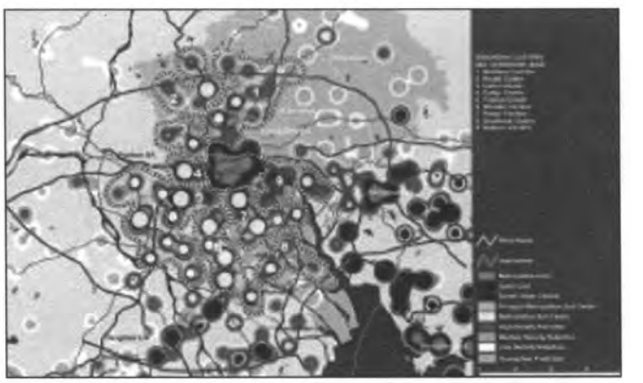


Fig. 35: Guangzhou corridors and clusters

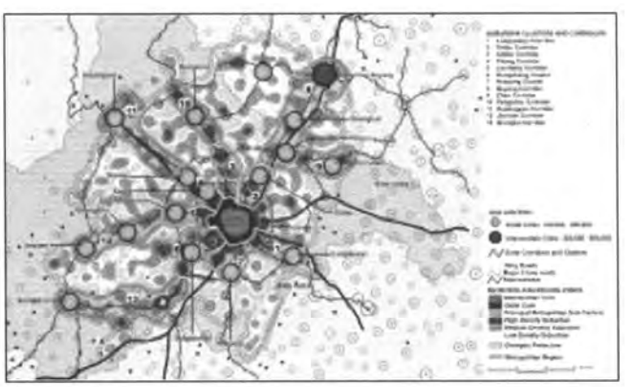


Fig. 36: Chengdu corridors and clusters.

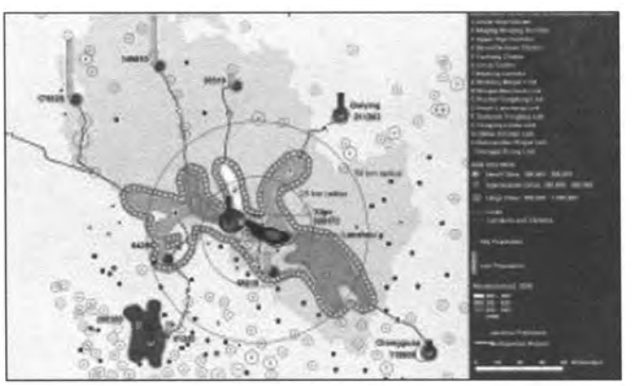


Fig. 37: Lanzhou corridors and clusters.

Fig. 38: NW Shanghai in 2020 per Master Plan approved in 2000.

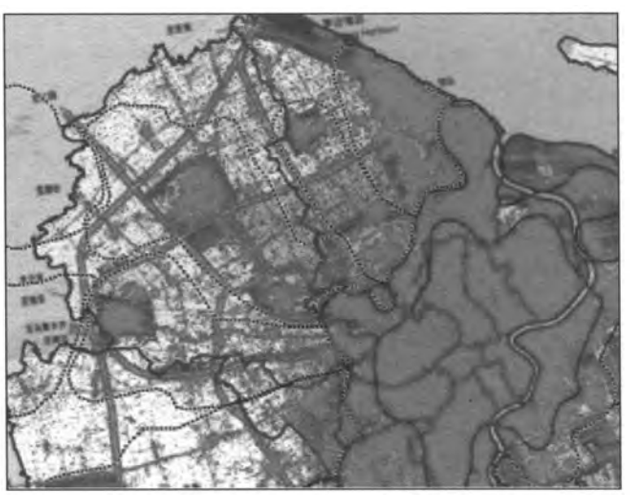


Fig. 39: NW Shanghai actual land use in 2002.

MRs are high, and some governments are attempting to address congestion and environmental externalities by promoting de-densification through resettlement to the outer cores and inner suburbs. But a long legacy of policy emphasis on central areas has yet to be overcome in many metropolises. Their outer cores – the transitional zones between the formal "builtup" urban districts and the more unregulated suburban towns, often now straddling the ubiquitous "outer ring roads" in many cities – are becoming an uncontrolled sprawl of formal and informal land uses with low levels of infrastructure and transport services and, in many cases, growing industrial pollution. This undermines agglomeration economies by decreasing efficiencies and raising the costs of social and economic interactions not only between the outer and inner corers, but also between suburban zones and the inner core.

The principal growth management challenges in China's metropolitan regions are:

- strengthening the development of principal and secondary sub-centers in the metropolitan region;
- increasing the connectivity between these sub-centers and with the metropolitan core;
- minimizing centripetal growth of scattered villages and small towns in suburban areas; and,
- minimizing scattered, centrifugal suburban development in the outer metropolitan core.

For metropolitan regions in China to maximize agglomeration benefits for their residents (including vulnerable groups) and enterprises, the structure and form of urban and suburban development need to be better managed. This will require a major shift in spatial scale by municipal governments beyond their urban districts to the functional metropolitan region as a whole, and by town governments who generally focus on their very limited spatial territories with little reference to wider regional trends and needs.

Governing and managing metropolitan regions

The comparatively rapid emergence of metropolitan regions in China is pushing existing forms of sub-provincial governance beyond their institutional and fiscal limits. Few societies in recent urban history have effectively managed the transformation of cities into large, dynamic and complex metropolitan regions. China has the opportunity to learn from the mistakes and successes of other countries, to modify the most relevant international practices to conform to the country's unique political, social and cultural conditions, and to apply them to harness the benefits of metropolitanization.

Perhaps the most important need is to shift political and institutional cultures to recognize the spatial extent, complexities, and importance of the metropolitan region. This needs to be done both from the bottom up – informing local stakeholders of the benefits of metropolitan regional development and how their individual actions can incrementally strengthen or detract from efficient and effective development – and from the top down, including at the highest political level. A first step could be the design and implementation of education programs and policy inquiries abroad for senior government leaders in municipal governments – and their policy advisors, both cadres and academicians. To be useful, such programs should be carefully designed as systematic and continuous acquisition, questioning, and application of new knowledge and not merely quick study tours abroad or short technical courses to mid-level technocrats. A growing number of multilateral and public agencies, and research organizations abroad are similarly trying to acquire, assess and synthesize understanding of how metropolitan regions evolve and how governments and other stakeholders can support their development most effectively. China needs to engage far more actively with these international agencies and organizations at every level.

A second important requirement is to rationalize the number and responsibilities of administrative jurisdictions in most of the country's metropolitan regions. Most current administrative boundaries and governmental jurisdictions were established decades ago (in some cases, centuries ago) to govern an agrarian society. Current administrative units are extremely fragmented in many of these regions (fig. 40), making inter-jurisdictional coordination and collaboration – a hallmark of well-functioning metropolitan regions – very difficult for all levels of government.

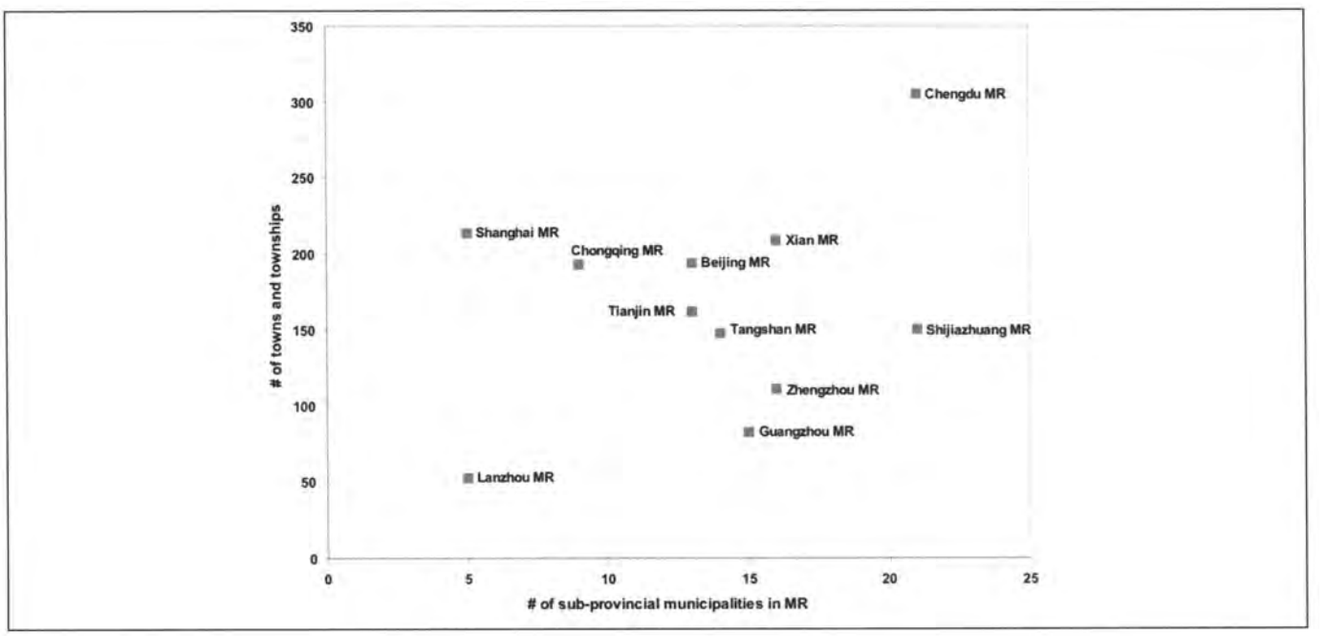


Fig. 40: Jurisdictional fragmentation in selected metropolitan regions, 2004.

In many areas, there are more than ten municipalities within a functional metropolitan region (PLCs, CLCs, and counties), and well over 100 relatively autonomous towns and townships.

But changing boundaries and administrative designations will not, on their own, improve metropolitan governance. These actions should be viewed as a rationalization measure to enable the re-allocation of functional responsibilities (and hence fiscal revenue assignments and expenditure responsibilities) among levels of government to support the efficient and equitable development of metropolitan regions.

China's "Law of The Local Peoples' Congresses and Local People's Governments" was enacted in 1979 and last revised in 1986: it does not define precise functional responsibilities that municipal governments are expected to exercise. Therefore, the delegation that is occurring is by administrative directive from the central and provincial levels. During this period of transition, understandably these directives are unpredictable and subject to modification which makes municipal planning and budgeting difficult. The best way to deal with such uncertainty is through the explicit and transparent codification of functional and fiscal assignments through constitutional amendments, new or revised legislation, clear regulations, and establishment of objective mechanisms to regularly monitor problems with assignments and recommend improvements.

Given the wide economic, social, cultural, and institutional differences among cities in China, it would be inappropriate to try to devise a model of functional responsibilities that would apply to all metropolitan regions in all provinces. Rather, some latitude needs to be given to provincial governments to develop models and structures most appropriate to their particular conditions. However, to ensure basic levels of equity and efficiency, the central government needs to clearly define the lower and upper margins of municipal functional responsibilities and explicitly tie these to expenditure and revenue assignments. For this framework to be effective, changes need to be made to the structure of municipal and sub-municipal administration so that assignments are made to units of government that have the territorial and functional mandates to exercise their responsibilities efficiently for the benefit of all residents.

Research needed now to support public policy

Public policies on metropolitan regions are at a tentative, embryonic stage of development in China. There are therefore two major policy needs. The first is to make policymakers aware of the existence and importance of metropolitan regions as a higher order scale of human settlement that needs to be better managed if agglomeration benefits are to accrue to China's enterprises and households. The second is to define at least an initial set of policies that:

- maximize the benefits of metropolitan regional growth;
- minimize the externalities of this growth; and
- distribute economic and social agglomeration benefits widely across regions, including to vulnerable populations.

In parallel, adjustments need to be made to existing governance arrangements and mechanisms so that policies can be developed, tested and implemented quickly and widely with the greatest benefit at the least possible cost.

Given the pace of development and resulting exigencies, our experience is that policymakers at all levels of government have limited interest in basic research on urban development in China, particularly by foreign analysts. They are, however, very interested in learning about international experiences of policies – both positive and negative – so that they can take lessons learned and apply them to China's unique social, cultural and institutional context. Indeed, this also applies to experiences in other cities within China, since there are few channels for meaningful exchanges among municipal governments. Comparative international and domestic research rooted in policy execution is, therefore, of greatest interest to policymakers.

While there is extensive experience in many countries in the development and management of metropolitan regions, some will be more relevant than others, given China's unique constraints to labor mobility (the hukou system), its system of state- and collectively-owned land and associated tenure rights, the allocation and security of public, quasi-public, and private rights over property, low levels of motorization, the historical legacy of population distribution within metropolitan regions, and China's tri-modal system of governance (Party, People's Congresses, and Administration). Within the context of these unique conditions, we propose the following policy-based agenda for research on metropolitan regions in China. The agenda is framed as questions that comparative research could seek to answer:

- **Theme A: Defining metropolitan regions**
  - How do other countries define metropolitan regions, both functionally and administratively? What criteria and measures do they use and why? How have these definitions changed over time, and why?
  - How important are metropolitan regions in other countries to output and employment growth? Do they matter more than smaller cities?
- **Theme B: Promoting agglomeration benefits of metropolitan regions**
  - How have governments promoted the growth of metropolitan regions? Which policies and instruments have worked best, and why? Which policies and instruments have failed, and why? Do proactive policies of government actually matter?
  - What measures (policies and instruments) have governments pursued (if any) to ensure the widest possible access to input and output markets across and between metropolitan regions, including those in global supply chains?
  - What conditions are required for localization economies (including from business clusters) to flourish in metropolitan regions? How have governments helped or hindered the development of localization economies across metropolitan regions?
  - What roles does human capital play in the economic development of metropolitan regions? How have local governments strengthened human capital, including inducing skilled and knowledgeable workers to move to their regions? Have government actions actually mattered?
  - What can local governments do, if anything, to foster innovation in their metropolitan regions, including supporting the development of regional innovation systems?
- **Theme C: Addressing Needs of Vulnerable Populations**
  - How have governments supported the integration of rural migrants into labor markets of metropolitan regions?
  - How have governments supported the integration of rural migrants into systems of social services and social security?
  - What policies, if any, have helped to integrate farming populations in suburban areas into metropolitan region labor markets?
  - How has farmers' land requisitioned by government or purchased by the private sector for conversion to urban uses been valuated? How have landholders been compensated?
- **Theme D: Managing the spatial structure of urban and suburban growth**
  - Has the spatial structure of metropolitan regions mattered to the realization of agglomeration benefits? If so, how?
  - How have the economic roles of suburban towns changed in the course of the development of metropolitan regions? How have governments supported these changing roles?
  - In market economies, how have land values across metropolitan regions changed as these regions have developed? What

are the principal drivers of changes to land values?

- What measures work best in rapidly-expanding metropolitan regions, at similar levels of motorization and economic development as in China, in providing cost-effective public transport across regions?
- How have governments controlled the location, density, and uses of land in rapidly-expanding suburban areas? How have they integrated suburban land development with regional public transport?
- How do governments in other metropolitan regions conserve agricultural and ecologically-sensitive land from urban and suburban uses? What instruments are most effective in land conservation?
- How have governments planned development of metropolitan regions that cross multiple jurisdictional boundaries? Which policies and institutional arrangements work best – and which have not worked? Why?
- How should governments monitor urban and suburban growth across metropolitan regions? What institutional arrangements are needed for effective monitoring and communication of findings?
- What urban development controls work most effectively in dispersed metropolitan regions with multiple administrative jurisdictions? Have these controls had negative, positive or only negligible effects on production and employment growth? On integration of rural populations into metropolitan regional labor and housing markets? Where in metropolitan regions have these affects been felt?

- **Theme E: Governing and Managing Metropolitan Regions**

- How have governments allocated functional responsibilities for delivery of public services (including infrastructure) across their metropolitan regions, particularly during periods of rapid growth?
- How have revenue entitlements (including transfers) and expenditure assignments matched with these functional responsibilities? How well do they work?
- What institutional mechanisms and arrangements work best in planning, regulating, and monitoring urban and suburban growth across the metropolitan region? What kinds of public participation in these arrangements work most effectively?
- What forms, if any, of regional delivery of infrastructure services have been pursued at the metropolitan regional scale? Which work best, and under what kinds of institutional conditions?
- How is the delivery of public services at the metropolitan region scale financed? What fiscal, regulatory and domestic capital market conditions are needed for the most cost-effective financing of regional infrastructure services?

While perhaps an ambitious agenda, governments at all levels in China will increasingly need answers to at least these 25 questions. Many researchers can, if they engage actively with China, provide answers to at least some of them based on their national experiences.

Economic and social changes over the past 20 years have created conditions in China that are likely to accelerate urban growth in many of the country's 53 metropolitan regions. These changes are supported by much greater mobility of labor, capital, technology and information than even a decade ago. If managed effectively, the agglomeration benefits that accrue to metropolitan regions in open economies could help drive China's continued economic growth and support social development well into this century. But if markets remain restricted, if vulnerable populations continue to be excluded from the benefits and opportunities enjoyed by more established urban citizens, and if the negative impacts of agglomeration in the form of uncontrolled sprawl and pollution are allowed to persist – all of which are beginning to happen, to varying degrees, in a growing number of China's metropolitan regions – then many of these regions could well become drags on provincial and national economies and focal points of social discord. Dysfunctional metropolitan regions in China could, given the country's scale, also have serious impacts on the future stability of global supply chains (including of energy resources and industrial commodities), on migration flows, and on regional and global environmental quality.

Focused, policy-oriented, and comparative research on metropolitan regions could help to inform China's policymakers on actions that could lead to more optimal outcomes.

Notes

1. The City Development Strategy (CDS) program is a global initiative operated by the Cities Alliance, a multi-donor initiative under the auspices of the World Bank. Its objective is to assist cities with the preparation of long-term municipal development strategies, from which short-term action plans are derived. While the CDS focus is on strengthening economic competitiveness, key components typically include poverty reduction, environmental protection, infrastructure improvements and institutional reforms. The CDS program in China is largely driven by requests from municipal governments. The first round of CDS in China (CDS 1) occurred in 2001; participating were the Changsha-Zhuzhou-Xiangtan City Region in Hunan province and Guiyang City in Guizhou province. The second round (CDS 2) in 2002-2004 included the city regions of Chengdu in Sichuan province, Erdos in Inner Mongolia Autonomous Region, Lanzhou in Gansu province, and Zhengzhou and Xinxiang in Henan province. CDS2 was launched by the World Bank and Cities Alliance after extensive consultations with the municipal governments of the client cities, and with central government agencies including the National Development Reform Commission, Ministry of Finance, and Ministry of Construction. The consensus from those consultations was that the second CDS in China should explore measures for improving the social, economic, and institutional linkages between the traditional "city proper" (comprised of districts of the statutory cities) and surrounding small and intermediate cities, towns and villages that together comprise the "city-region." See www.citiesalliance.org.
2. Chreod Ltd was commissioned to provide technical consulting inputs to both CDS projects after international competitive tendering by the World Bank. Other assignments for the World Bank and ADB which addressed the 15 other city-regions included: Review of Suburban Development Trends in Metropolitan Shanghai (2003; World Bank, with NTFESSD support); Metropolitan Development in Chongqing (World Bank; 2003); Review of Urban, Economic and Environmental Trends in Pearl River Delta (2002; for World Bank with CIDA INC support); and Preparation of a Provincial Development Strategy for Hebei (2004; Asian Development Bank; conducted in collaboration with the Shanghai Development Research Center).
3. Data on production inputs and outputs (input-output analysis), labor markets (labor force surveys, journey to work surveys, origin-destination surveys), retail markets (retail surveys), land markets (data on land transactions by location and type of use), and housing markets (sales, rentals, construction by location) are either not collected in China, are collected but are then tightly held by individual government agencies or, in the case of origin-destination surveys, are collected individually in cities every five years but are also tightly held by local transportation institutes.
4. Nomenclature of Territorial Statistical Units is a system used by Eurostat to break down administrative units of EU member countries, and against which all countries now report statistics.
5. Population data from the 2000 Census are available in tabular form by Town, Township and Street Committee. Given the magnitude of obtaining accurate polygon boundaries for all of these units, the data were digitized as 51,000 points on Chreod's China GIS, using location data obtained from a wide variety of local sources. Densities are calculated through a process called kriging, which approximates Gaussian kernels on a grid surface: densities decline proportionally to a value of zero at a distance of 4 km from the point, unless interpolated with densities from another point within the 4 km radius. Considerable calibration was conducted of the most appropriate radius for calculating densities, given the average number of data points (population) available within a 50 km radius of the city center. This was done by overlaying calculated density

grids over recent satellite (30 meter Landsat TM) imagery until built-up land use and the extent of calculated population densities generally matched. Tests were conducted of radii of 10, 8, 6, 4, and 2 km; the 4 km radius had the most significant match to builtup land on recent satellite images of the Pearl River Delta, Shanghai, and Chengdu.

6. Slopes over this level are usually not technically and economically compatible with infrastructure and building construction required to sustain large-scale urban settlement. Slopes were calculated using 90-meter grid data from a USGS Digital Elevation Model covering all of China.
7. Chreod digitized on its GIS several years ago a data set on traffic flows along all 3,063 segments of China's national highways in 1996. The data set includes road quality from Class I to Class IV roads (and often below Class IV) for all segments which are, on average, 35 km long. The data show traffic flows, and hence the intensities of connections between cities, in 1996, the year that NTHS expressways began to open across China. However, all NTHS links are tollroads, and a large proportion of local (i.e. within 50 km of a city) traffic continues to occur along the old national highway network (which is toll-free). NTHS is predominantly carrying medium and long range freight traffic. Therefore, while the 1996 traffic flow data set does not reflect actual flow patterns in 2004, the locations of production have not changed appreciably since 1996. In the absence of current traffic flow data, the 1996 data set provides at least an indication of the relative intensity of links within metropolitan regions that probably continue to exist today.
8. Eurostat, the statistical agency of the European Union, has for several years been attempting to develop an approach for defining what it calls "densely populated areas" that conform to functional metropolitan regions (or "conurbations") without relying on labor force data that is difficult to obtain and compare temporally across member states. As a provisional measure, it has decided to define such areas as "groups of territorial units at NUTS level 5 [the smallest administrative unit of EU countries] with more than 50,000 population inhabitants and consisting of contiguous local units each with a population density of over 500 inhabitants per km^2" (EUROSTAT, 1999).
9. Jones (2002) summarizes recent research on Southeast Asia. The GEMACA II project in Europe, a comparative study of 14 major metropolises in northern Europe, is described in Lecomte (2002). More recent research on European metropolitan regions under the EU-supported POLYNET research program is described in Institute of Community Studies (2005).
10. China's National Census in 2000 provides information at the county/city level of the principal occupation of the head of household. The breakdown of types of employment is quite detailed, and enables the estimation of non-farming populations based on type of employment.
11. The ten strategic challenges are: 1) focusing urbanization in the 53 metropolitan regions; 2) maximizing access to markets across MRs; 3) promoting inter-firm linkages across MRs (localization economies); 4) improving strategic production capacities across MRs; 5) enhancing innovation capacities; 6) addressing needs of vulnerable populations across MRs, including in suburban areas; 7) managing urban development at the MR scale; 8) managing the environment at the MR scale; 9) improving governance and management of MRs; and 10) improving the financing of MRs. A set of 55 policy recommendations were made in the report which is available from the Cities Alliance (CHREOD Ltd, 2005).
12. Urbanization is defined here as non-farming population resident longer than six months as percent of total population.
13. Acs (2002) provides a recent, thorough analysis of the impact of innovation on metropolitan regions in the USA. This work suggests a possible approach to similar analysis that could be followed in China.
14. The government-sponsored innovation system is very centralized with the highest concentration of enterprises, personnel, and innovations located in Beijing, Shanghai, and Tianjin. There is growing evidence that the government-sponsored system is losing innovation capacities through the net loss of knowledge creators. A recent survey by the Ministry of Science and Technology of science- and engineering-based government research institutes found an alarming net loss of their personnel through retirement, departures overseas (either immigration or for advanced studies), and to commercial enterprises. Attenuating this threat to innovation capacity is the commercialization of universities and their research institutes over the last ten years whereby they are increasingly expected to become self-financing. This results in the hoarding of knowledge and weak transfers to government and enterprises.
15. The domestic enterprise innovation system is also disaggregated and highly internalized. Individual companies, particularly those not within state-controlled "enterprise groups," closely hold acquired knowledge and its translation into innovation as key attributes of their competitiveness. This is exacerbated by weak regulatory mechanisms to protect intellectual property, an issue that affects not only foreign firms but also a growing number of domestic innovators. Linkages between firms and universities are also weak, largely due to a tradition of vertical knowledge flows in state-controlled educational institutions.
16. Tan (2001) provides a systematic review of this process in China, and describes how a few large Chinese companies are beginning to break the "interrupted product cycle" pattern by developing "reversed cross-national production networks" [Chinese firms investing abroad] in the telecomm sector.
17. The transferring of mature technologies to China is not a cynical action of large multi-national corporations – much of the technology has come from SME investors – but simply a recognition that, with China's low labor costs, the level of technology input required to realize output prices that global markets are prepared to pay is lower than in countries where labor costs are higher (e.g. Malaysia and Republic of Korea, to which more advanced technologies have been transferred by foreign firms over the last decade).
18. Satellite data were prepared by Annemarie Schneider, K. Seto, and D. Webster, from The Urban Dynamics of East Asia Program, Asia Pacific Research Center, Stanford University, California, USA. Chreod Ltd gratefully acknowledges the sharing of these data and associated insights of the Stanford team.
19. Editor's note: In the original version of the text at this point there was a reference to Annex A consisting of 14 pages of drawings and diagrams that we had to finally eliminate due to lack of space. However, for the benefit of the reader, we thought of reproducing here the brief introductory statement written by the author to this Annex entitled "Spatial structure and population densities of selected metropolitan regions in China and other countries" which is as follows:

    The maps and diagrams on the following pages show spatial structure and population densities of 20 metropolitan and urban regions in China, Japan, France, the US, and Canada. All density zones were computed using 2000 population data at the towns/township/Street Committee level for China, and census tract or NUTS 5 data for other countries: the spatial size of these data units are virtually the same. Density zones are calibrated according to the descriptive spatial model of metropolitan regions shown in figure 2. Population densities are all shown on the profile diagrams at 1 km increments (with densities calculated in a 4 km radius from each population point).

    This work is ongoing. The purpose is to identify key spatial characteristics of metropolitan regions, compare these characteristics across as large a sample as possible, and then to explore if and how spatial structure has affected social, economic and environmental conditions at various times in the formation and growth of metropolitan regions, and the impacts that governance practices have had on spatial structure. Lessons learned could then, hopefully, be translated into specific policy and then program recommendations to better guide developments in China and elsewhere of this large and complex scale of human settlement.

    For further information, the reader may contact the author at e-mail: leman@chreod.com; www.Chreod.com.

References

ACS, Z.J. (2002), *Innovation and the Growth of Cities* (Cheltenham, Edward Elgar).

CHESHIRE, P. (1997), "Economic indicators for European cities and regions: Why boundaries matter," paper presented at Eurostat Seminar on Urban Indicators, Barcelona, 14-16 April, 1997.

CHREOD Ltd (2005), *Strategic Options for China's Metropolitan Regions* (vol. 5). Consultant report to the World Bank (East Asia

Urban Sector Unit) and the Cities Alliance on China: City-Region Development Strategies 2 Project (Ottawa, Chreod Ltd).
EUROSTAT (1999), "The densely populated areas in the European Union: Towards a delimitation and characterization of urban areas," *Statistics in Focus Series* (Brussels, Eurostat).
FLORIDA, R. (2005), *Cities and the Creative Class* (New York, Routledge).
GOTTMANN, J. (1961), *Megalopolis: The Urbanized Northeastern Seaboard of the United States* (New York, Twentieth Century Fund).
GOTTMANN, J. and R.A. HARPER (eds.) (1990), *Since Megalopolis: The Urban Writings of Jean Gottmann* (Baltimore, Johns Hopkins University Press).
INSTITUTE OF COMMUNITY STUDIES (2005), Commuting and the definition of functional urban regions: Summary Report. POLYNET Action 1.1 (London, Institute of Community Studies/ The Young Foundation, and Polynet Partners).
JIANG XIAOJUAN, (2001), "The new regional patterns of FDI inflow: Policy orientation and the expected performance," Paper presented to the OECD-China Conference on Foreign Investment in China's Regional Development: Prospects and Policy Challenges, Xian, 11-12 October, 2001.
JONES, G.W. (2002), "Urbanization trends in Asia: The conceptual and definitional challenges," Paper presented to the conference on "New Forms of Urbanization: Conceptualizing and Measuring Human Settlement in the Twenty-first Century," organized by the IUSSP Working Group on Urbanization. Bellagio, Italy, 11-15 March 2002.
LECOMTE, D. (2002), "Company competitiveness and the regional economic environment," *Cahiers de l'aurif,* no. 135, December (Paris, Institut d'Aménagement et d'Urbanisme de la Région d'Ile-de-France).
POPULATION DIVISION OF THE DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS OF THE UNITED NATIONS SECRETARIAT, World Population Prospects: The 2002 Revision and World Urbanization Prospects: The 2001 Revision, http://esa.un.org/unpp, 28 December 2004.
QUIGLEY, J. M. (1998), "Urban Diversity and Economic Growth," *Journal of Economic Perspectives,* vol. 12, no. 2, Spring 1998 (Nashville, American Economic Association).
SIMMIE, J. (ed.) (2001), *Innovative Cities* (London, Spon Press).
TAN, Z. (2001), "Product Cycle, Wintelism, and Cross Cross-national Production Networks (CPN) for Developing Countries: China's Telecom Manufacturing Industry as a Case," Syracuse University.

Conditions for effective management of a river basin in the European Union

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Introduction

The uncontrolled, irrational use of the water ecosystem, either as a production and consumption factor or as a discharge receiver, results in the constant degradation of its quality and in the increase of the deficit in water balance, with negative impacts on economic development and social welfare.

After 25 years of European water legislation, related to the protection of drinking water, bathing waters, fish/shellfish waters and groundwater, a new European Water Framework Directive (WFD, 2000/60/E.C., O.J. L327/22.12.2000) was adopted in October 2000, which incorporates and updates all previous objectives. It includes 26 Articles and 11 Annexes and establishes the framework for community action, in order to reach a "good" ecological status by 2015 in all inland (rivers and lakes), estuarine and coastal waters, as well as in the associated underground waters.

River basin management

A river basin – also known as catchment basin or watershed – is the area of land from which all water flows towards the sea. This area is used as the planning-management unit in the case under consideration.

The WFD requires member states to establish river basin management plans for the protection, improvement and sustainable use of water resources.

An economic analysis of water uses (Article 5 and Annex III) is needed to support the design and the implementation of these plans. As stated in the WFD, the economic analysis in the field of water policy should contain enough information in order to:

- make the relevant calculations for the application of the full cost recovery principle, taking into account long-term forecasts of supply and demand for water in the river basin district; and,
- make judgments about the most cost-effective combination of management measures.

In order to carry out this economic analysis, it is necessary to have the participation of all interested parties. A guidance document relevant to the WFD (E.C., 2002a) cites: *"This participation is defined as allowing people to influence the outcome of plans and working processes. It is a means of improving decision making, to create awareness of environmental issues and to help increase acceptance and commitment towards intended plans. This participation can avoid potential conflicts, problems and costs in the long term."* Thus, the adoption of co-management principles could be considered as a prerequisite for their effective involvement.

Co-management is defined as the cooperative and participatory process of regulatory decision making among representatives of user-groups, government agencies and research institutions. The institutional design is included in the conditions for the success or failure of co-management regimes. Furthermore, a flexible management system is required where all the actors are in an entrepreneurial and creative role (JENTOFT et al., 1998).

Co-management should be seen as a continuously evolving process where a set of alternative management strategies, which are appropriate in certain situations and conditions, are examined (NIELSEN and VEDSMAND, 1999). An overview of effective participatory processes is provided by De Jong et al. (1997).

For the organization of a co-management framework in the water sector, firstly the cooperation between natural and social scientists is required, in order to identify, with the contribution of the stakeholders' knowledge, the relationships between the water ecosystem and the socio-economic activities in the study area.

Consecutively, the dissemination of scientific knowledge in a way that could be understood by the users (through meetings, workshops, discussions) and the exchange of opinions with other groups of stakeholders for the design and implementation of the policy measures are important steps for the improvement of the water quality in cost-effective ways, which is the aim of the WFD (see the second component of the economic analysis mentioned earlier).

According to Karl (2000), *"Projects that were socio-culturally compatible and based on an adequate understanding and analysis of the social conditions had average rates of economic return that were more than twice as high as those for socially incompatible and poorly analyzed projects."* Moreover, education-information programs, which will improve the users' positive involvement in these water policy processes, are required.

The evaluated proposed management measures, resulting from this cooperation of all the parties concerned, are presented by the scientists to the public decision maker. The presentation of these results and of the analysis of the data and the procedures used with a structure, which will facilitate the finding of information and argumentation, will contribute to their adoption.

Hereunder, a description is given of the relationships between scientists, users and policy makers which are needed in order to accomplish the objectives of the economic analysis, in the framework of a successful integrated river basin management.

Relationships between natural and social scientists

The studies in the water sector, undertaken by natural and social scientists, concern the relationships between the water ecosystem and socio-economic activities, under the so-called DPSIR (*Drivers-Pressures-State-Impacts-Response*) framework (E.E.A., 1999; UN, 1999).

Within this framework a systemic analysis is carried out among the *drivers* by anthropogenic activities and their *pressures* on the water ecosystem, which result in the degradation of the water quality *state* with negative *impacts* on social welfare. A policy *response* is needed and alternative policy options could be evaluated with the support of an economic analysis.

An analytical presentation of the components of the economic analysis included in the text of the WFD, mentioned previously, could help the identification of the continuous exchange of opinions required between the different disciplines of scientists.

Concerning the first component of the economic analysis (*"the identification of full cost recovery of water services"*), knowledge of the social, environmental and economic effects of the recovery is needed (WFD, Article 9). With the use of the Cost-Benefit Analysis (CBA) or the Multicriteria Analysis (MCA), this knowledge could be drawn through the evaluation of the proposed measures related to pricing structures of water services and uses. More specifically:

- Cost-Benefit Analysis (CBA) calculates the net present value of a policy option in order to find the options which improve the social welfare (social benefit > social cost). CBA provides useful information for the users' willingness to pay and the incentives requirements, for the distribution of the costs and benefits between social groups, for the economic efficiency of a project, and for the use and non-use monetary value of an environmental asset, etc. (TIETENBERG, 1996; BOARDMAN et al., 2001; E.C., 2001b; FLORIO and VIGNETTI, 2003).
- Multi-Criteria Analysis (MCA) is also a decision support tool, considering the impacts which cannot be measured easily in monetary units, and it allows for the simultaneous consideration of multiple, often conflicting, objectives. In MCA there is a ranking of alternative scenarios, including environmental and socio-economic values with different weight and points of view, in order to select the most feasible preferable option (NIJKAMP, et al., 1990; HERMANIDES and NIJKAMP, 1997).

It is by CBA or MCA that the social and ethical dimensions of water pricing are studied. For instance, the impact of full cost recovery of water supplies on farmers with low-income is examined for irrigation purposes. Moreover, the possible negative environmental impacts are also considered. As an example of the environmental problems of a new water tariff, one could mention the case of the Greater Athens area (Greece) in 1993 when it was decided that the Water Company (EYDAP) change the water price with increasing rates of consumption (escalated water charge), in order to reduce the consumption of household water. As a result, this policy had a significant decrease in the domestic water supply but it had also negative impacts from the uncontrolled drilling of wells. From this example the need arose for cooperation with the public sector, in order to organize administrative control (new personnel or training courses, etc.), before the design and adoption of new tariffs in water supply. With this control there will also be increased efficiency of the existing irrigation networks (e.g. in most regions of Greece there is only 50 percent efficiency of the irrigation networks, ZANOU and ANAGNOSTOU, 2001).

Moreover, in the framework of the CBA or MCA, a study should be included concerning the level of financial support to actors, mainly for the sector which uses the greatest quantity of water supply. For example, in cases where agriculture is the main human activity (e.g. in Greece the irrigation of farms covers about 75 percent of the total water supply), financial support could be given before the imposition of new water tariffs, for:

- the adoption of new irrigation methods;
- the recycling of water and the re-use of wastes; and,
- the non-cultivation of water intensive crops that would be harmful to the environmental balance.

Beyond financial support, land reclamation works (mini dams, channels for the run-off of stagnant waters, flood controls, etc) should be examined.

Furthermore, before the application of water pricing practices, the information-consultation or/and education of end-users should be organized (e.g. training courses and technical assistance for the new irrigation methods, the new crops, etc). The information gained would also minimize the political cost, which in many cases is the reason for the non-application of cost recovery.

The cost and the benefit of the above-mentioned actions are included in the procedure of the CBA or MCA. These methods are also appropriate for waterfront management (fishery, aquaculture, tourism, coastal and marine constructions, marine transportation) where conflicting uses and various ranges of socio-economic requirements should be arranged, with environmental principles.

Concerning the second component of the WFD economic analysis, i.e. *"the identification of the most cost effective combination of management measures achieving the environmental objectives of the Directive,"* the Cost-Effectiveness Analysis (CEA) (E.C., 2002b; ZANOU et al., 2003) is used for the evaluation of the proposed measures.

With CEA a ranking of measures according to their cost and environmental effectiveness is undertaken to achieve a specific environmental objective ("x" reduction of pollutants) in a water body level.

For the cost-effectiveness evaluation of the measures, there is an interdependency between the environmental and the socio-economic study. For instance, let us suppose that, in the study of a water body, environmental scientists identify a eutrophication problem caused by agricultural run-off ("the main source of nitrogen pollutants is the run-off from agricultural land," E.C., 2002c). In this case, a 50 percent nitrogen (N) abatement of agricultural run-off is necessary in order to achieve the improvement of the water quality.

A team of social scientists studies the land use, and the socio-economic profile of the area affected by this water body, and they pay particular attention to the analysis of agricultural activities as well as the collection of information related to the legislation, administrative framework and existing development plans. These quantitative and qualitative indicators will be used for the identification of alternative management measures in the agricultural sector, considering that the target is "the nitrogen (N) abatement".

The achievement of "50 percent" reduction of N signifies the need for the application of more measures and also a different combination of measures, in comparison with another target where a smaller decrease of N (e.g. 20 or 30 percent) was required.

Nevertheless, the marginal cost of the measures examined, calculated by the social scientists, could change the environmental target of the 50 percent N decrease proposed by the natural scientists. In other words, let us suppose that for a 50 percent reduction the cost of the required management measures is US$35 million and for a 45 percent N reduction the cost is US$25 million, i.e. a 5 percent increase in N (nitrogen) reduction

would cost US$10 million. The social scientists would then present these costs to the natural scientists who would reconsider whether the achievement of the proposed target (50 percent decrease of N) is essential for the environmental balance in the study area, or if there is a possibility to decrease this percentage, due to budget limits.

In this framework of the cooperation and exchange of opinions between the natural and social scientists, the involvement of users is required.

Relationships between scientists and users

Article 14 of the WFD states the need for public participation including users of water. As mentioned in the relevant guidance document of the E.C. (E.C., 2002a), the existing forms of public participation have an increasing level of involvement. These forms are:

- supply of information;
- consultation; and,
- active involvement.

According to the WFD the first two are ensured and the latter should be encouraged. Moreover, consultation implies supply of information and active involvement implies consultation.

The choice of participation level depends on the political and historical context of users' involvement, available resources, etc. Some case studies state that there was information or consultation of users, but no analysis of the action taken. An indicative context of the action, included in the three above-mentioned forms of participation, is the following (E.C., 2002a):

- Access to background information: e.g. creation of an information center in a river basin, responsible for information management and dissemination.
- Consultation: reports, scenarios or plans presented on which interested parties are asked to comment. There are two types of consultation: the written consultation and the oral consultation. The oral consultation is more active and users have the possibility to discuss with the competent authorities (interviews, workshops or conferences).

A good proposal is the combination of these two types of consultation, i.e. active involvement which means that users actively participate in the planning process by discussing issues and contributing to their solution.

Overall, higher levels of participation are "shared decision making" and "self-determination." Shared decision making implies that interested parties not only participate actively in the planning process but also become partly responsible for the outcome, e.g. water-use sectors could be represented in the river basin organizations. Self-determination implies that (parts of) water management are handed over to the interested parties, for example by establishing water users' associations.

Beyond the choice of participation level and the determination of the action needed for its application, it is also very important to know the factors influencing the users' participation. According to this document (E.C., 2002a) these factors are:

- the context factors (culture, resources, history of previous attempts, etc.);
- the process factors (co-ownership of the process design, creation of opportunities for learning, encouragement to respect other people's views, flexible and "open" processes, continuous evaluation); and,
- the content factors (evaluating diversity of knowledge, decisions based on all the available evidence, explicitness in conditions of uncertainty, reporting).

In another study related to the water policy (WILSON, 1997), where questionnaires are given to farmers in ESAs in the U.K., the author has classified all the factors that may influence the farmers into two central categories (scheme factors and farmer factors) and he also cites that "in many studies the relationship between attitudes and behavior is complex".

Wicker (1969) points out that there is often a significant difference between the attitude and action of users.

Morris and Potter (1995) lay out the complexity of factors influencing a farmer's decision making about participation or non-participation in a agro-environmental scheme. The authors have used questionnaires in order to explain the participation of farmers in agro-environmental schemes in the U.K. and make a point of the need to study the relationship between "willingness to adopt" and "ability to adopt" (i.e. the economic status of the farmer and the economic barriers to apply a new practice).

Therefore, considering that the determinative factor for the application and the effectiveness of water policy measures are the end-users, priority is given to identifying the appropriate process-techniques in each case study, in order to know the profile of users for an effective exchange of knowledge and experience.

Different program-models have been established for their successful participation in watershed management (COLLENTINE et al., 2002).

Jentoft et al. (1998) cite *"when users obtain more management responsibility in functional terms, they are likely to behave more responsibly in moral terms. An important consequence may be greater compliance with agreed-upon regulations."*

Particular attention in their consultation/education is also needed as this is one of the strongest variables determining their behavior. The vital role for the application of the appropriate education programs is recognized by the European Commission and other international organizations as well, as is demonstrated in the results of case-studies in the water policy sector. Most of these case-studies, which examine the end-users' profile, focus on farmers.

For example, in the Pyrovetsi and Daoutopoulos study (1997), data were collected from Greek farmers interviewed on the demographic variables of farm operators, on irrigation practices, on their attitudes towards the environment and wetland resources, on their opinion on the Common Agricultural Policy reform as well as their knowledge on the impact of agriculture on the local environment. The results of this paper revealed the need to provide farmers with information and education regarding environmental issues.

In Morris and Potter (1995), it is cited that the application of a new measure depends on the willingness of farmers to participate. This willingness can be encouraged through the use of advice and training and by exploiting the demonstration potential of those who have already implemented successful farming.

As mentioned by Gilman (2002), users will be more likely to accept changes in their traditional activities if they understand and support their roles through direct participation in planning and management decision making.

This issue is also noted in Curry (1997), where the farmers have adopted a new practice because they had a more direct role in the formulation of environmental policies through consultation before the policy was introduced or in other cases through a wide-ranging series of discussions. This "policy networking" had helped in the understanding of the new policy, the reasons for it, and the acceptance to implement it.

As Borrini-Feyerabend (2000) argues, in the framework of the co-management of natural resources, social communication has remarkable effects including one-to-one dialogue and group meetings, for example with brainstorming, which is a gathering technique based on a freewheeling offer of non-leading ideas. This technique can elicit multiple ideas on a given issue or problem.

Kristensen et al. (2001) give the results of questionnaires filled in by farmers in two study areas in Jutland (Denmark). An anal-

ysis of the existing links is presented between a number of human factors (such as age, employment level, duration of farm ownership and farmer's landscape activities) and the relationship between farm location and farm characteristics. The authors suggest that agro-environmental programs have a higher chance of success if they are adapted to local conditions both in terms of the biophysical and the socio-economic environment.

From these indicative examples we may mention that the involvement of the end-users in the planning process, with a "common understanding," is a prerequisite for successful water management on a sustainable basis.

Moreover, scientists should organize workshops and meetings with other groups of stakeholders[1] (local authorities and other interested political representatives, NGOs, the public) for the dissemination of research data and exchange of opinions, during all the steps of planning and implementation processes.

In a report of the E.C. (E.C., 2001a) is cited "*It is generally thought that increased stakeholder participation in the early phases of the preparation of policy measures not only reduces the risks of ill-conceived legislation but also improves implementation significantly.*"

As Van Asselt and Rijkens-Klomp (2002) state according to the relevant interesting literature cited in their study, *"the engagement of non-scientific knowledge, values and preferences through social discourse will improve the quality of research by giving access to practical knowledge and experience and to a wider range of perspectives and options".*

Relationships between scientists and public policy decision makers

River basin management measures aim at mitigating the existing water pollution, preventing the creation of new polluting activities and minimizing the conflicts of land uses. For the realization of these purposes, the following policy options could be examined:

- New legal and administrative framework on a level of country or case-study. It is noted that before the adoption of a new legislation, in cases where the existing legislation has not been implemented, examination of the reasons for this non-application is required (i.e. non-application due to very strict or too flexible legislation or due to lack of financial resources, or because of an ineffective administrative structure or due to residents' reactions, etc). Furthermore, there is need for the identification of the responsibilities and actions of the authorities involved and the efforts for their coordination.
- Construction of infrastructures (land reclamation works, wastewater treatment plants, etc.) with particular attention paid to their operation, taking into account existing examples of treatment plants, dams, etc., which have not been used due to lack of funds for their operation and maintenance.
- Use of market based mechanisms (instrumental economy such as subsidies, charges, etc, and/or environmental agreements) for the application of new management practices (new mode of cultivation, changes in land use, use of new environmental friendly technologies, water recycling, etc.).
- Horizontal measures of support:
  - The need for new research activities, taking into account that with new research results the future uncertainty will be decreased and the preventive management mechanisms could be increased.
  - Efforts for better insight into the behavior and attitudes of the users which could be achieved through appropriately designed workshops, training courses, and technical assistance, in order to stimulate the active/positive participation of all the stakeholders.

The optimum combination of the above-mentioned policy options could be defined according to the environmental objective for each river basin studied; the consideration of the socio-economic impacts of these options, the competitive advantages of the region, its development planning and the budget constraints.

Furthermore, the evaluation of the efficiency and effectiveness of measures already adopted through monitoring programs is needed for the design of a new policy.

According to an E.C. report (E.C., 2001a), an evaluated project should give responses for the: *"(i) Efficiency: Are the immediate outputs proportionate to costs and resources used? (ii) Effectiveness: Have the stated objectives been achieved? (iii) Relevance: Does the intervention meet the needs or solve the problems for which it was launched? and (iv) Sustainability: Will the benefits last over time?"*

However, specific evaluation questions according to the context of the evaluated measure(s) should also be formulated. The identification of these questions is the most important step in the design of an evaluation project.

In this report is also cited: *"It is very difficult to evaluate the results or impact of a programme or policy if its objectives are vague, if no indicators for success were defined, or if no data on resources used and outputs delivered are available".*

For the economic evaluation of the policy measures, as mentioned above, the Cost-Benefit Analysis (CBA), the Cost-Effectiveness Analysis (CEA) or the Multicriteria Analysis (MCA) etc. should be used. The evaluated results will provide the public decision maker with the required information for the water policy design.

Sometimes, the CEA is confused with the CBA. The basic difference between these two decision-supporting tools is that in the CEA the economic cost of a management measure is compared by its effectiveness in physical units (e.g. tons of nitrogen (N) abatement per year), allowing a relevant rating of the measures examined, while the CBA evaluates measures in absolute terms by expressing all the effects in monetary terms. The problem with the CBA is to reliably monetarize the ecological consequences of emission reduction policies (SCHLEINIGER, 1999; McALLISTER, 1995).

As a practical example, for a better understanding of the different results of the CBA and CEA submitted to the policy maker, we may consider the evaluation of the management measure as "restoration of a wetland." The use of this example is based on its importance for the WFD implementation.[2]

The selection of CBA or CEA depends mainly on the target required. More specifically:

- The CEA is used if the target is the calculation of the environmental effectiveness of the wetland's restoration (e.g. there is a decrease of the water pollution by wetland "x", which has a retention capacity of 0.5 of the nitrogen (N) load).

For the estimation of the cost for the actions, in order to achieve this restoration, the following have to be estimated:

- the cost for the studies as well as for the workshops, meetings, etc. with stakeholders, in order to identify in detail the exact steps that have to be taken for the application of the measure,
- the cost for the construction-operation-maintenance of the necessary infrastructures,
- the "opportunity cost" of land,
- the cost of information or required education of the stakeholders,
- the cost of application/control by public authorities; and,
- the monitoring cost (sampling stations for the calculation of the environmental effectiveness) (ZANOU, 2003).

The addition of these cost components will give the total cost of this measure, which will be compared with the cost of other measures examined.

Thus, with the CEA the direct target is to find low-costing mea-

sures for the decrease of water pollution and the indirect target is the improvement of "human welfare," through the expected water quality improvement. Furthermore, it is useful to note that without the calculation of the environmental benefit of a measure it is not possible to identify the total socio-economic benefit, which is calculated with the CBA method (ZANOU, 2003).

• With the use of the CBA, a monetary evaluation is made of the measures needed for the increase of wetland functions and services, in order to increase social welfare. This welfare includes:

- economic benefits;
- social benefits; and,
- biodiversity protection.

More specifically:

- **Economic benefits** provided by the environmental improvement and the required change in the land uses. That is to say, there will be an increase of revenues of existing or of new activities by actions for:

• the decrease of soil erosion;
• the protection against floods;
• the run-off of stagnant waters;
• the inhibition of wetland use as a disposal site for debris of illegal constructions and sand extractions; and,
• the determination of low-intensive activity zones with also the development of new activities (e.g. organic farming, winter crops, aquaculture units, recreational opportunities, etc.).

A new land use planning is needed in order to decrease the polluting activities and the conflicting uses, as well as to create new revenues from the increased land value and the created new economic activities in the wetland area and around it (e.g. tourist shops, shops with fishing equipment, restaurants, etc). This category of economic benefits also includes the saving costs from wetlands services (ecological flood protection and wastewater-effluent-sink) in comparison with the cost needed for the construction and operation of the relevant engineering infrastructures, which in some cases are not in accordance with the environmental balance.

- **Social benefits** for today and also for future generations, from recreational opportunities such as fishing, bird-watching, strolling on footpaths, and generally enjoying the landscape. Furthermore, benefits from educational possibilities and new scientific research results are also provided.

- **Conservation and increase of biodiversity.** Considering that losses of biodiversity affect the functioning of ecosystems and the support of the human life system, the protection of natural habitats has been widely recognized as a priority. In this framework, wetland functions and services promote the conservation of biodiversity and the sustainable use of its components.

For a calculation of the cost of the action needed for the achievement of the above-mentioned benefits from wetland services, the following cost components, included in a CBA, will be added in the existing cost equation used in the CEA:

• the cost of the investment in the new forms of tourism (e.g. stations for bird-watching, footpaths, etc.);
• the administrative costs (public authorities services); and,
• other costs according to the designs of the wetland use in which the shadow prices for the social benefits are also included.

All this information, resulting from the application of the CEA or CBA or from other evaluated methods, is provided to the decision maker who will promote the policy outcomes.

In other words, from this information the policy maker will find responses for:

• the anthropogenic pressures and their impact on the water ecosystem;
• the need for the adoption of the proposed management measures;
• their cost and effectiveness; and,
• their socio-economic effects.

The optimal use of this enormous quantity of information depends on the structure of its presentation.

The team of scientists should support the work of the decision maker with precise information on the comprehensive organization so that it is easily found and understood.

Conclusion

River basin plans are needed in order to promote social, economic and environmental benefits from water uses and services on a sustainable horizon.

For the design and effective implementation of these plans, a co-management framework should be identified, based on:

• The continuous cooperation among the scientists of different disciplines: The study of the economic analysis included in the E.U. Water Framework Directive identifies the plan of their relationships, the socio-economic and environmental data required and the methods used for the evaluation of the proposed management measures. These methods are the Cost-Effectiveness Analysis (CEA), which is used for the evaluation of the water pollution control options, and the Cost-Benefit Analysis (CBA) or the Multicriteria Analysis (MCA), which are mostly applied in the policies of water pricing and waterfront management.

• The participation of users: Their successful involvement depends on the choice of participation level, the analysis of the factors influencing their participation and, in general, on the identification of the process-techniques required for each case-study. Particular attention to their consultation-education is also needed, as this is one of the strongest variables determining their behavior.

• The exchange of opinions with all the other stakeholders (the local authorities and the other interested political representatives, the NGOs and the public) during all the steps of planning and implementation processes.

• The presentation of all this information to the policy maker with a structure, which facilitates the understanding and finding of data.

Van Asselt and Rijkens-Klomp (2002) state that "it is of crucial importance that principles, considerations, arguments, participatory process design and lessons learned are documented in a structured and transparent way to encourage collective learning." This framework of "common understanding" could contribute to the implementation of the European Water Framework Directive with the improvement of water quality and social welfare.

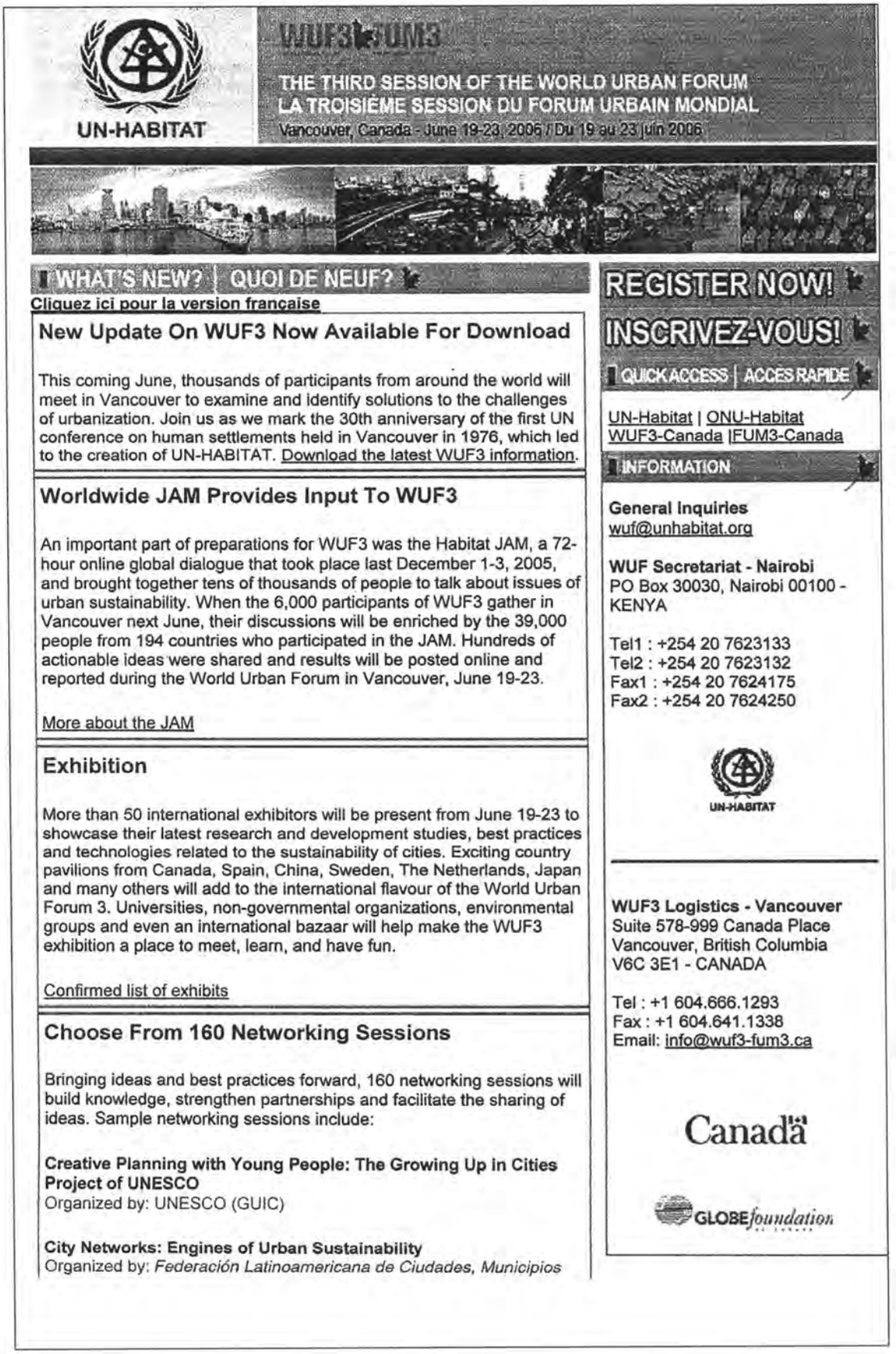
Notes

1. The term stakeholders includes all organizations and individuals who have management responsibilities or have the power to influence decision-making process or could have a role in the implementation of decisions or will be affected by the resulting management activities (E.C.1999). The most fundamental division between stakeholders is between those who affect (determine) a decision or action, and those affected by this decision or action (GRIMBLE and WELLARD, 1997; KARL, 2000).
2. E.C. (2003) "*Wetland creation and enhancement can in appropriate circumstances offer sustainable, cost-effective and socially acceptable mechanisms for helping to achieve environmental objectives of the WFD*". See also: ZANOU et al. (2003).

References

BORRINI-FEYERABEND, G. (2000), *Co-management of Natural Resources: Organising, Negotiating and Learning by Doing* (IUCN, Yaounde, Cameroon).

BOARDMAN, A.M., D.H. GREENBERG, A.R. VINING and D.L. WEIMER (2001), *Cost-Benefit Analysis: Concepts and Practice* (New York, NY, Prentice Hall).
COLLENTINE, D., A. FORSMAN, V. GALAZ, S. KALLNER and A. STAHL-DELBANCO (2002), "CATCH: Decision support for stakeholders in catchment areas," *Water Policy,* vol. 4, pp. 447-463.
CURRY, N. (1997), "Providing new environmental skills for British farmers," *Journal of Environmental Management,* vol. 50, pp. 211-222.
DE JONG, D., V. MENDONCA and S. LUCIANI (1997), *Resources on Participatory Approaches and Communication for Water and Sanitation Programming: Annotated References* (IRC International Water and Sanitation Centre and UNICEF).
E.C. (1999), *Lessons from the European Commission's Demonstration Programme on Integrated Coastal Zone Management (ICZM),* DG Environment.
—— (2001a), *Evaluation and Transparency*, Report of the W.G. II.2, White Paper on European Governance (http://europa.eu.int/comm/governance/).
—— (2001b), *Guide to Cost-Benefit Analysis of Investment Projects* (Structural Funds-ERDF, Cohesion Fund and ISPA), DG Regional Policy, Brussels.
—— (2002a), *Guidance on public participation in relation to the Water Framework Directive: Active involvement, consultation and public access to information,* Guidance Document, W.G. 2.9 (web page: see E.C. 2003 cited).
—— (2002b), *Economics and the Environment: The implementation challenge of the WFD*, Guidance Document No 1, Working Group WATECO (web page: see E.C. 2003 cited).
—— (2002c), *Eutrophication and health,* Luxembourg.
—— (2003), *Guidance on monitoring for the Water Framework Directive,* CIS-W.G. 2.7 (http://forum.europa.eu.int/Public/irc/env/wfd/library, Guidance Documents).
E.E.A. (1999), *Environmental indicators: typology and overview*, Technical report No. 25 (http://reports.eea.eu.int).
FLORIO, M. and S. VIGNETTI (2003), *Cost-benefit analysis of infrastructure projects in an enlarged European Union: an incentive-oriented approach,* Working Paper no 13, Department of Economics, University of Milan (http://netec.mcc.ac.uk/ WoPEc.html).
GILMAN, E. (2002), "Guidelines for coastal and marine site-planning and examples of planning and management intervention tools," *Ocean & Coastal Management,* vol. 45, nos. 6-7, pp. 377-404.
GRIMBLE, R. and K. WELLARD (1997), "Stakeholder methodologies in natural recourse management: A review of principles, contexts, experience and opportunities," *Agricultural Systems*, vol. 55, no. 2, pp. 173-193.
HERMANIDES, G. and P. NIJKAMP (1997), *Multicriteria evaluation of sustainable agricultural land use: A case of Lesvos,* Serie Research Memoranda 0005. Free University of Amsterdam, Faculty of Economics, Business Administration and Econometrics.
JENTOFT, S, B.J. McCAY and D.C. WILSON (1998), "Social theory and fisheries co-management," *Marine Policy,* vol. 22, nos. 4-5, pp. 423-436.
KARL M. (2000), *Monitoring and evaluating stakeholder participation in agriculture and rural development projects: A literature review* (FAO, Sustainable Development Department).
KRISTENSEN, S.P., C. THENAIL and L. KRISTENSEN (2001), "Farmers' involvement in landscape activities: An analysis of the relationship between farm location, farm characteristics and landscape changes in two study areas in Jutland, Denmark," *Journal of Environmental Management*, vol. 61, pp. 301-318.
McALLISTER, D. (1995), *Evaluation in Environmental Planning. Assessing Environmental, Social, Economic and Political Trade Offs* (Cambridge, MA, MIT Press).
MORRIS, C. and C. POTTER (1995), "Recruiting the new conservationists: Farmers' adoption of agri-environmental schemes in the U.K.," *Journal of Rural Studies,* vol. 11, no. 1, pp. 51-63.
NIELSEN, R.J. and T. VEDSMAND (1999), "User participation and institutional change in fisheries management: A viable alternative to the failures of "top-down" driven control?" *Ocean & Coastal Management*, vol. 42, no. 1, pp. 19-37.
NIJKAMP, P., P. RIETVELD and H. VOOGD (1990), *Multicriteria Evaluation in Physical Planning* (Amsterdam, Elsevier Science Publishers).
PYROVETSI, M. and G. DAOUTOPOULOS (1997), "Contrasts in conservation attitudes and agricultural practices between farmers operating in wetlands and a plain in Macedonia, Greece," *Environmental Conservation,* vol. 24, no. 1, pp. 76-82.
SCHLEINIGER, R. (1999), "Comprehensive cost-effectiveness analysis of measures to reduce nitrogen emissions in Switzerland," *Ecological Economics,* vol. 30, no. 1, pp. 147-159.
TIETENBERG, T. (1996), *Environmental and Natural Resource Economics* (New York, NY, Harper Collins College Publishers).
UNITED NATIONS (1999), *Indicators of Sustainable Development* (United Nations, Commission on Sustainable Development).
VAN ASSELT, M.B.A. and N. RIJKENS-KLOMP (2002), "A look in the mirror: Reflection on participation in Integrated Assessment from a methodological perspective," *Global Environmental Change,* vol. 12, pp. 167-184.
WICKER, A.W. (1969), "Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects," *Journal of Social Issues,* vol. 25, pp. 41-78.
WILSON, G.A. (1997), "Factors influencing farmer participation in the Environmentally Sensitive Areas (ESA) scheme," *Journal of Environmental Management,* vol. 50, pp. 67-93.
ZANOU, B. (2003), "Cost minimization function for water pollution control: Determination of variables and influencing factors," *Mathematical Review,* vol. 59, pp. 28-41 (Greek Mathematical Society) (in Greek).
—— and C. ANAGNOSTOU (2001), "Integrated management in the drainage basin of the Thermaïkos Gulf (NW Aegean Sea). Methodological steps and proposed measures, according to the win-win policy," *European Water Management*, vol. 4, no. 6, pp. 33-42.
——, A. KONTOGIANNI and M. SKOURTOS (2003), "A classification approach of cost effective management measures for the improvement of watershed quality," *Ocean & Coastal Management,* vol. 46, no. 11-12, pp. 957-983.



The third World Urban Forum (WUF3), Vancouver, Canada, 19-23 June, 2006: Part of preliminary program.

Global urbanization, is it sustainable?

The challenge to the UN World Urban Forum in Vancouver, 2006

H. Peter Oberlander

The author is Professor Emeritus and founding Director of the University of British Columbia's School of Community and Regional Planning. He also founded the UBC Centre for Human Settlements, Canada's legacy of HABITAT 1976 Conference. He is currently the Senior Advisor to the Commissioner General of WUF 2006 and was a key organizer of HABITAT 1976, the UN's first conference on Human Settlements. Professor Oberlander was inducted into the Order of Canada in 1995 and promoted to Officer in 2001, with the following Citation: "He is an important advocate of sustainable urbanization – the process of improving the quality of our cities while promoting their sustainable growth. Widely respected by governments and international organizations, he served in the mid-1990s as a Senior Advisor for the United Nations Commission on Human Settlements." The text that follows is a slightly revised and edited version of a paper presented at the international symposion on "The Natural City," Toronto, 23-25 June, 2004, sponsored by the University of Toronto's Division of the Environment, Institute for Environmental Studies, and the World Society for Ekistics.

Introduction

The 19th century is characterized by its radical change of production, distribution and consumption of goods and services resulting in explosive industrialization. The 20th century responded by rapid urbanization, and the 21st century has launched globalization of both industrialization and urbanization at an exponential rate. To varying degrees, all continents are engulfed in the tidal wave of industrialization/urbanization. This inexorable change is sweeping before it all traditions and political structures, and confronting the global community with increasing challenges but also new opportunities.

While this process seems inevitable, is it sustainable in terms of its local, national, and global impacts? A broadly based consensus rooted in professional practice, academic research, and the opportunity for political action indicates that while urbanization is global, it is unsustainable at its current rate of change. Thereby hangs both a global confrontation and the seeds for solutions. Can the rate of change be reduced?

Since the beginning of time, human settlements have been founded, have grown and multiplied, bringing with them successful adaptation to the resulting social, economic and environmental changes. The fundamental difference between these historic trends and current global consequences is the rate of urbanization and its inability to adjust adequately and comprehensively to the exponential rate of change. The human species, in all its manifestations, has always been able to adjust to more and more people living in more and more cities. That growth was gradual. The unprecedented acceleration of urbanization/industrialization is threatening the world stability and has made the process unsustainable.

As the major nexus of economic and social interchange, the city is in a historic position to mitigate the destructive consequences of globalization.

The UN World Urban Forum, 2006

A unique opportunity for the global community to review current and foreseeable consequences of global urbanization will occur when Canada hosts the UN World Urban Forum in 2006 in Vancouver. This event will celebrate 30 years since the United Nations first came to Canada as HABITAT '76[1] (fig. 1) and launched the global search for solutions to the impending urban

Fig. 1: A photograph from the press conference, to release the Declaration of the Vancouver Symposium on 30 May, 1976, just prior to the UN-Habitat Conference. From left to right: Enrique Peñalosa, Secretary General of Habitat, Maurice Strong, former head of the UN Environment Program and co-Chairman of this Symposium, and Barbara Ward, economist and author. (*Source: Ekistics,* vol. 42, no. 252, November 1976, p. 271).

tsunami. At that time, Canada proposed, as a legacy for HABITAT '76, the creation of the UN Commission on Human Settlements, and its operative Center for Human Settlement, located in Nairobi. Through its Center, the Commission has actively pursued global policies, regional programs, and local projects during three decades, with increasing success. It is now urgent to review and assess success and failure and move the agenda to deal with the increasing speed of urbanization and its potentially devastating environmental and human consequences.

Preceding the recent 2005 UN General Assembly, its Secretary General convened an extraordinary meeting to consider Millennium Development Goals and the process of meeting them, as indicated at the Millennium session of the UN five years ago. At the beginning of our recent millennium, eight Millennium Development Goals were articulated to establish specific practical and achievable targets for the world community to improve life for all and particularly for the poorest of the poor. Goal no. 7, dedicated to ensuring environmental sustainability through its Targets 9, 10, and 11, will form the conceptual framework for presentations and discussions at the World Urban Forum in June 2006.[2] This Millennium Development Goals framework has become subject to a global contract of UN Member Nations. Indeed on September 15, 2005 Canada signed the UN "Convention" of Millennium Development Goals and thereby committed itself to achieving them within Canada and through the UN community of nations.

Convening the UN World Urban Forum (WUF 2006) in partnership with UN HABITAT in Vancouver and focusing on the implementation of the UN Millennium Development Goals raises opportunities and hope that, next spring, those attending the World Urban Forum in Vancouver will live up to its aim of identifying practical solutions to global urbanization and: **taking ideas into action.**

WUF 2006, with its focus on the UN Millennium Development Goals, brings back moving memories of architect and planner, C.A. Doxiadis,[3] the father of EKISTICS, the first systematic research and analysis of human settlements that initiated global discussion of urbanization, particularly in terms of its impact on the developing world (figs. 2 and 3).

Fig. 3: The 1964 Delos Symposion (Delos Two), last session. From left to right: Jaqueline Tyrwhitt taking notes, Barbara Ward discussing the text of the Declaration, and Margaret Mead. (*Source:* C.A. Doxiadis Archives).

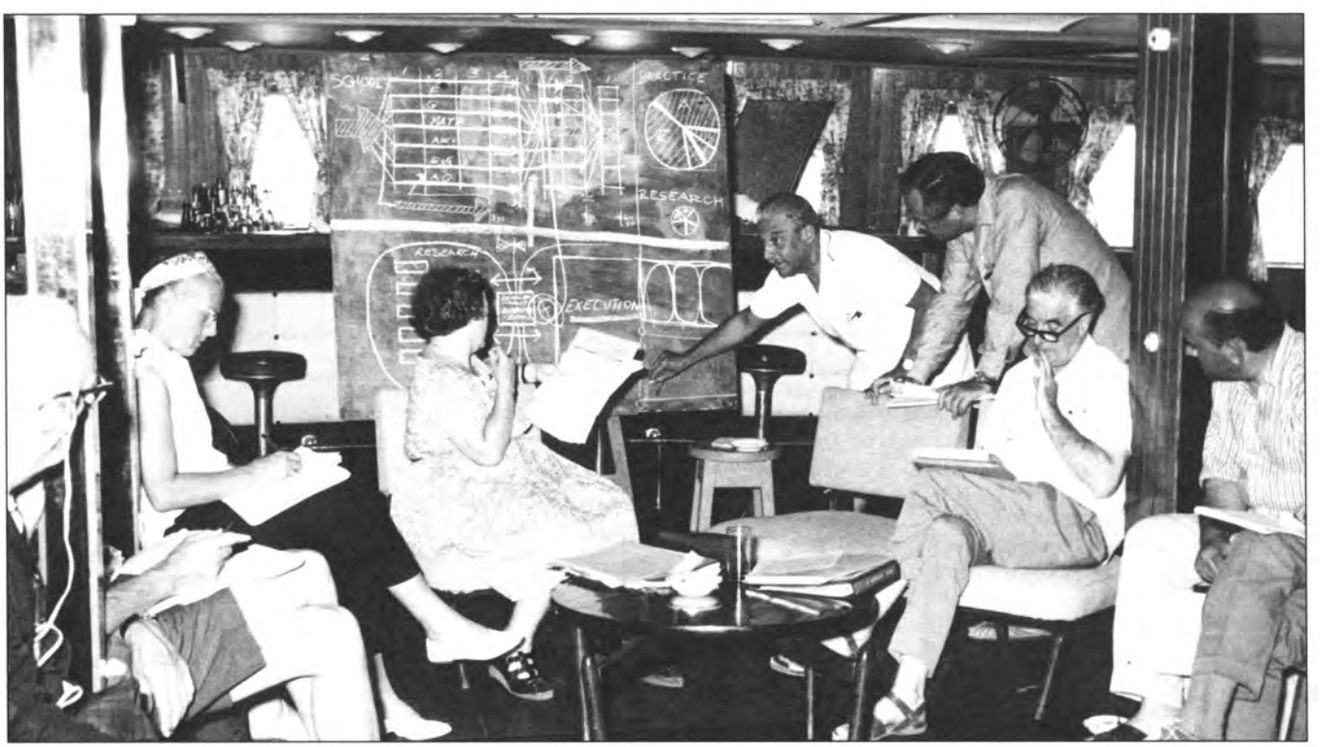


Fig. 2: The Sixth Meeting of the 1964 Delos Symposion (Delos Two) on board ship at the island of Patmos, July 18. From left to right: R. Buckminster Fuller, Jaqueline Tyrwhitt, Margaret Mead (Chair), C.A. Doxiadis, Lord Llewelyn Davis, Sir Robert Matthew, and Mohamed S. Makiya. (*Source: Ekistics,* vol. 18, no. 107, October 1964, p. 219).

Once again, WUF 2006 will build in Doxiadis' pioneering writings, his Delos Symposia, his Aegean Sea cruises and his continuing rigorous research. Without Doxiadis' initiative, the UN trajectory of timely meetings would never have succeeded. The intellectual and professional activism of urbanist Barbara Ward (Lady Jackson), anthropologist Margaret Mead, editor and author Jaqueline Tyrwhitt, architect Ernest Weissmann, or author Catherine Bauer would never have laid the foundations for the continuing systematic search for solving the problems of exponentially accelerating settlements through global action. Through systematic, multidisciplinary analysis, Doxiadis created the context for national and local political action. Sustainability was the goal, resiliency became the process.

WUF 2006 will celebrate 30 years since the UN Habitat conference met in Vancouver. There, it pursued its agenda through two independent discussions:

- one was the official, formal Assembly of 140 UN Member Nations;
- the other was an non-governmental organization (NGO) forum.

These two solitudes barely met and proceeded on their unreconciled trajectory. This will not happen in 2006. WUF III will be an inclusive, integrated, open-ended opportunity for broadly based discussion, analysis and actions.

Another major change since 1976 will be the explicit involvement of the "city building professions," through their regional and national Associations, including the Canadian Institute of Planners, the Royal Architectural Institute of Canada, the American Institute of Architects, the Canadian Society of Landscape Architects and their international equivalents. Experience has demonstrated that architects, landscape architects, engineers, planners, surveyors and others in public or private practice are responsible for "building the cities," individually and collectively. Through their Associations, these professions are contributing to the current preparations for WUF 2006 and will encourage full membership attendance during the **Forum**. This Congress of Professions will provide a **creative/innovative** opportunity for engaging the consumer and the producer in advancing action to improve life and living, globally.

Accumulated professional experience and public opinion indicate the essential convergence of a deep concern for the built environment and nature, with a unique opportunity for mutual support. The world's urban population is now estimated at six billion. Four billion live **in** cities and the remaining live **by** the city.

Urbanization is global; but its impact is local and varies considerably across the world. Poor and less developed regions are particularly vulnerable and deserve special attention by the global community through the United Nations. Preparations for and participation in WUF 2006 will allow all of us to compare notes on what is possible and to develop a common agenda of actions to mediate the city's impact on nature.

To reach out to the global community, Canada and UN-Habitat will host *HABITAT JAM* – December 1-3, 2005 – a unique internet-based collaborative event. More than 100,000 people from around the world will have met in real time virtually, to offer guidance on the WUF III agenda. This inaugural online event promises to be one of the most innovative experiments in creating a mechanism for a truly global dialogue, and could become another Canadian innovation.

Conclusion

Urbanization is a given. The question is: "is it sustainable?" Since Rachel Carson raised the alarm more than four decades ago, the city's relationship with nature has been fully described, evaluated and thoroughly measured. Now the time has come to reverse the inevitable and enlist global societies and their human and economic resources to maintain the city's historic civilizing impact.

The forecasted **urban tsunami** has occurred; can we now develop strategies and tactics to turn this reality into a global, sustainable process, and reach beyond the nation-state to connect the cities of the world into a grand alliance? Thereby, could we re-establish the historic leadership role of cities that pre-dates the nation-state and gave us historically "*civitas*" or "*civilization*" and perhaps even move towards global peace?

Editor's notes

1. The Vancouver Symposium was convened for two days just prior to the UN-Habitat Conference, 1976. Participants included the following: Soedjatmoko and M. Strong (Co-Chairmen), B. Ward (Rapporteur), H. Beer, R.R. Bergh, L. Brown, C. Correa, R. Buckminster Fuller, J. Gorynski, J. Gottmann, L.S. El-Hamamsy, J. Hardoy, I. Harrington, O. Koenigsberger, A. Kwapong, A. Laquian, A. Mobogunje, M. Mead, J. Mundey, P. Psomopoulos, J. Rios, J. Rouse, E. Terrazas, and J. Ui.
2. The UN lists 3 targets under Goal no. 7: Target 9 – Integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources; Target 10 – Reduce by half the proportion of people without sustainable access to safe drinking water; Target 11 – Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020 (www.un.org/millenniumgoals).
3. Architect and planner C.A. Doxiadis organized annual "Delos Symposia" where he invited experts from a variety of disciplines, hosting them on a cruise through the Aegean sea, and resulting in a final stop on the island of Delos, where "Delos Declarations" on issues of human settlements and ekistics were submitted to the United Nations.

Ekistic grid index

The articles in this issue are coded by the scale of settlements and an aspect of an element indicated in the ekistic grid.

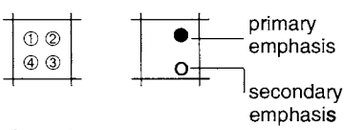
The content of each article is classified within an ekistic grid as follows:

- The scale of the settlement(s) with which the article deals is selected from among the 15 ekistic units:

No.	Name	Population
1	Anthropos	1
2	Room	2
3	House	5
4	House group	40
5	Small neighborhood	250
6	Neighborhood	1,500
7	Small polis	10,000
8	Polis	75,000
9	Small metropolis	500,000
10	Metropolis	4 million
11	Small megalopolis	25 million
12	Megalopolis	150 million
13	Small eperopolis	1,000 million
14	Eperopolis	7,500 million
15	Ecumenopolis	50,000 million

- The subjects dealt with in each article are selected from among the subheads of the five ekistic elements. The position of a dot in any square of the grid indicates which of the four subheads is being referred to. If the article arrives at a synthesis of these elements, either in a physical plan or in ekistic theory, the dot is at the top or bottom of the square.

key to placement of subheads



The subheads of the elements are:

NATURE
1. Environmental Analysis
2. Resources Utilization
3. Land Use, Landscape
4. Recreation Areas

ANTHROPOS
1. Physiological Needs
2. Safety and Security
3. Affection, Belonging, Esteem
4. Self-actualization, Knowledge and Aesthetics

SOCIETY
1. Public Administration, Participation and Law
2. Social Relations, Population Trends, Cultural Patterns
3. Urban Systems and Urban Change
4. Economics

SHELLS
1. Housing
2. Service Facilities
3. Shops, Offices, Factories
4. Cultural and Educational Units

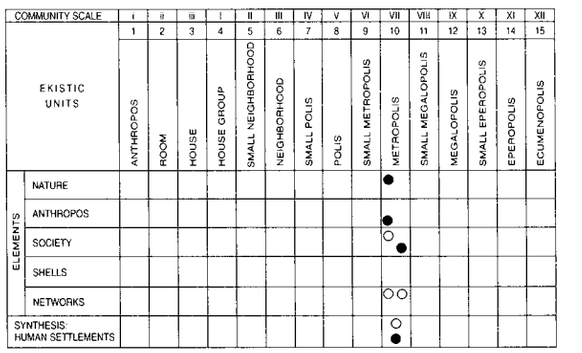
NETWORKS
1. Public Utility Systems
2. Transportation Systems
3. Personal and Mass Communication Systems
4. Computer and Information Technology

SYNTHESIS
1. Physical Planning
2. Ekistic Theory

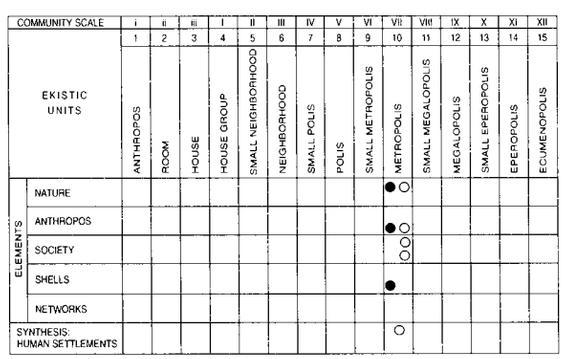
Each article is described by keywords, which are also used in the *Ekistic Index,* and by abbreviations referring to their illustrative content.

Keyword letter code

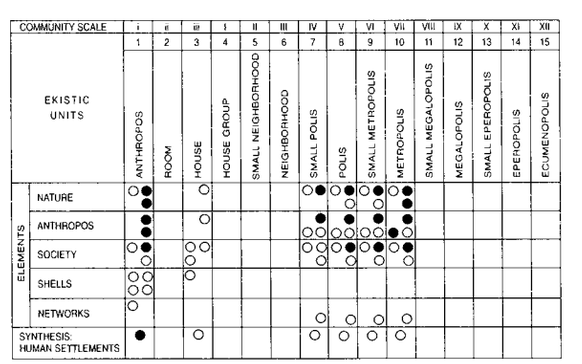
D = Diagrams
I = Illustrations
M = Maps
R = References
S = Statistics, Tables, Graphs
X = Simulation, Mathematical Models, etc.



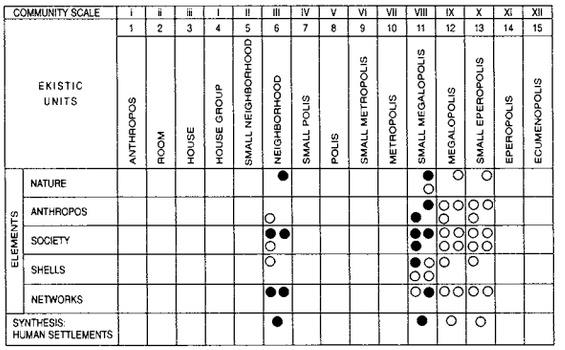
The editor's page p. 167
Natural City, Public Education, Research, Ekistics General; Past, Present, Future



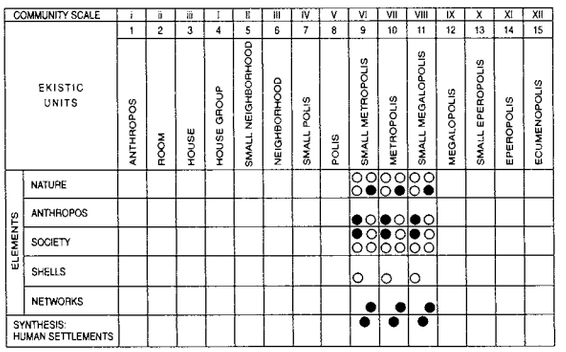
Envisioning the natural city: The guest-editor's p. 168
Nature, Natural City, Public Education, Research General, Toronto; Present, Future I



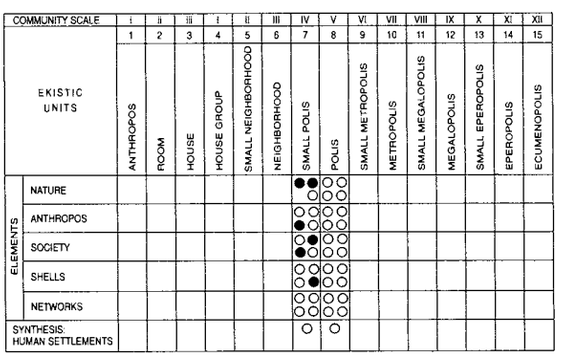
Mitigating natural disasters: The role of eco-ethics p. 170
Natural Disasters, Community Organization, Eco-ethics, Planning, General, Canada; Past, Present, Future D,R



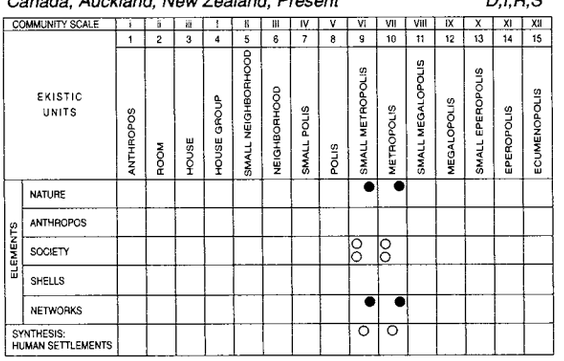
Resettlement of development-induced displacees **p. 181**
Nature, Population Displacements, Ecological Disasters
Developing Countries, World; Past, Present, Future *R*



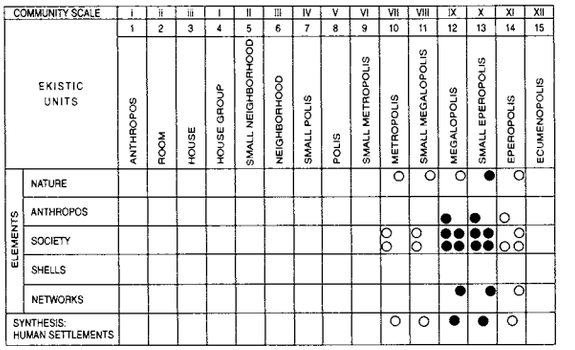
The role of the university in city planning: **p. 192**
Politics, Community Participation, Planning Process
USA, Cleveland, Ohio; Present, Future *D,M,R,S*



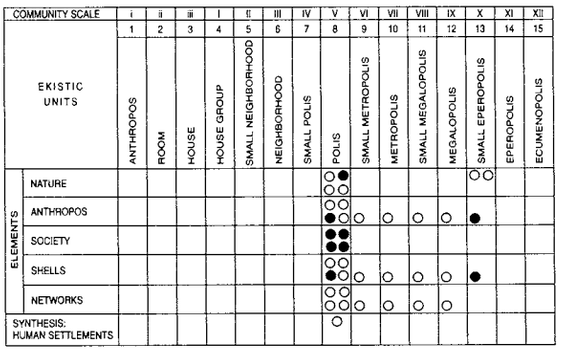
The "Greening the Ivory Towers" Project: The University **p. 213**
University Campus, Sustainability, Education, Research
Canada, Auckland, New Zealand; Present *D,I,R,S*



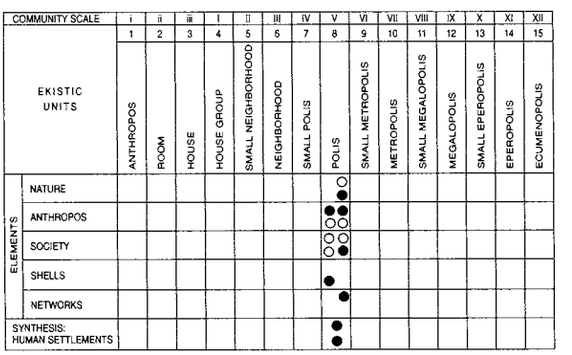
Tethered vehicle systems for sustainable cities **p. 228**
Nature, Sustainability, Energy, Transportation
General, Western Countries; Present, Future *D,I,R,S*



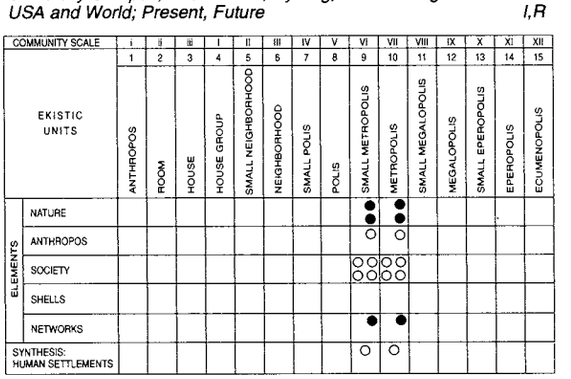
The city at the end of the cheap-oil era **p. 187**
Energy, Technology, Sustainability, Politics
World; Past, Present, Future *D,I,S*



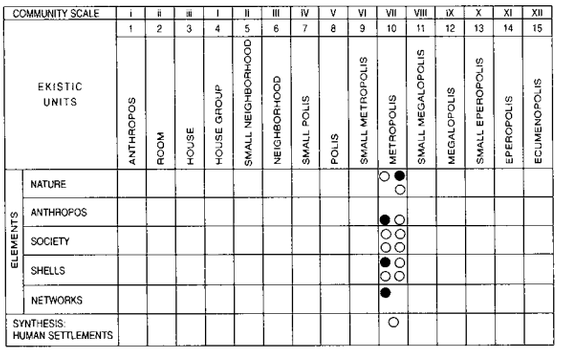
Through the (not so) Green Door: University campus **p. 203**
University Education, Sustainability, Research
University of Plymouth, UK; 1990 to Future *D,I,R*



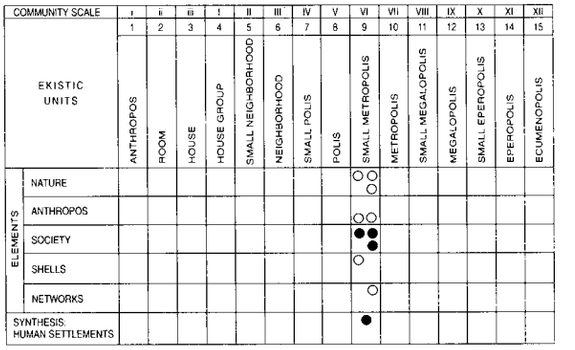
Non-motorized mobility in cities of the future **p. 223**
University Campus, Pedestrians, Cycling, Urban Design
USA and World; Present, Future *I,R*



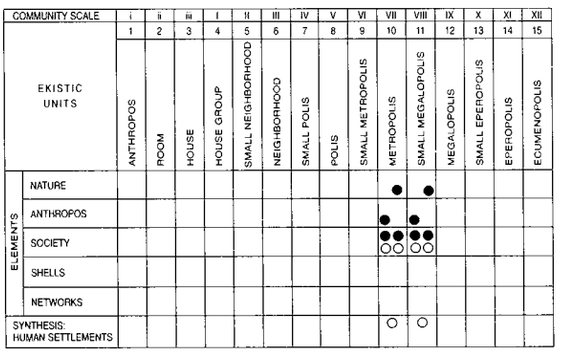
"Localization": A means to reduce negative **p. 233**
Ecology, Sustainability, Planning
General; Present, Future *R*



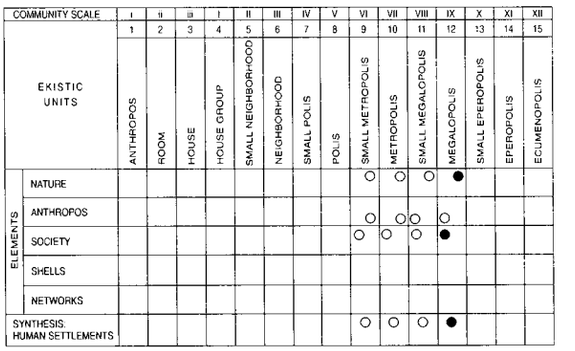
Sustainable housing design and the natural **p. 236**
Housing, Sustainability, Design
General; Present, Future *R*



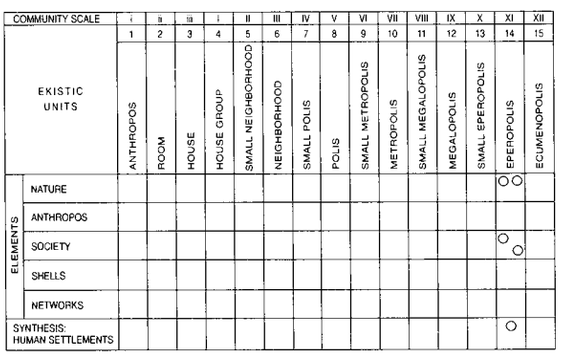
Planning the emergent Basque megalopolis as **p. 245**
Natural City, Spatial Planning, Urban System
Basque; Past, Present, Future *M,R*



Metropolitan regions: New challenges for **p. 255**
Metropolitan Regions, Management, Governance
P.R. China; 2000 to 2004 *D,M,R,S*

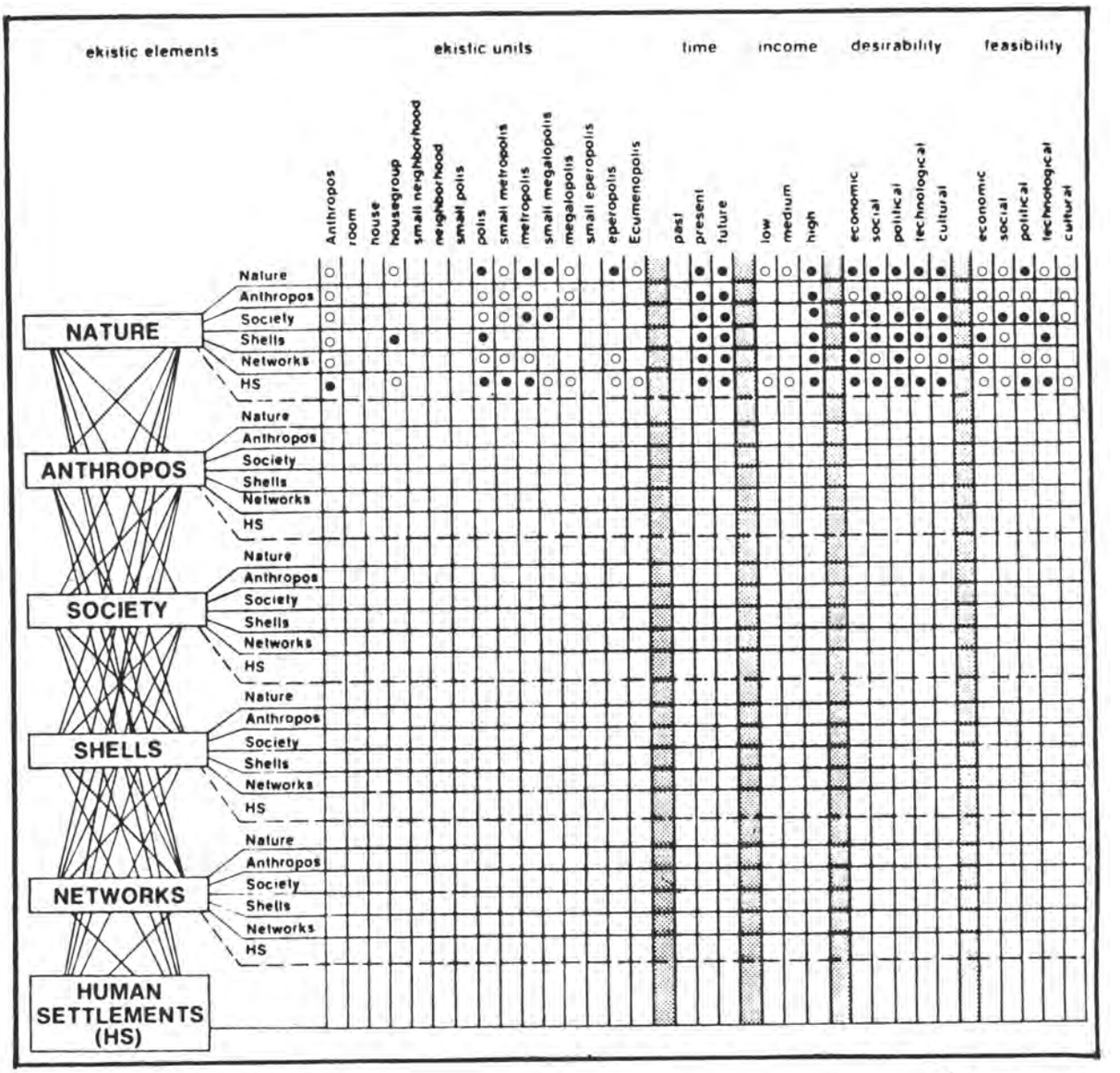


Conditions for effective management of a river **p. 282**
Water Management, Politics, River Basin Regulations
European Union; Present *R*



Global urbanization, is it sustainable? The **p. 289**
Global Urbanization, Sustainability, UN Habitat 1976
UN 2006 Urban Forum; Past, Present, Future *I,R*

The anthropocosmos model



Adapted version of model for EKISTICS

The focus of papers in vol. 71 is on the relation of nature and its basic components – from vegetation and all other resources to climate – with the other elements of human settlements, i.e. Anthropos, Society, Shells and Networks. Emphasis is on the desirability for a conscious effort towards maintaining a constant balance between all five elements of human settlements, taking into consideration the dynamic changes identified at present and/or anticipated for the future. The feasibility of such an effort is supported by encouraging cases of success in high-income communities, particularly at scales from the house group to the metropolis – and much less on larger scale human settlements.

Note: Usually the Anthropocosmos Model reflects the contents of the issue in which it is printed. This time, however, it refers to the contents of both triple issues of vol. 71 (Part 1 and Part 2) on "The Natural City."

"The Natural City" Symposion: Action never ceases

1

3

4

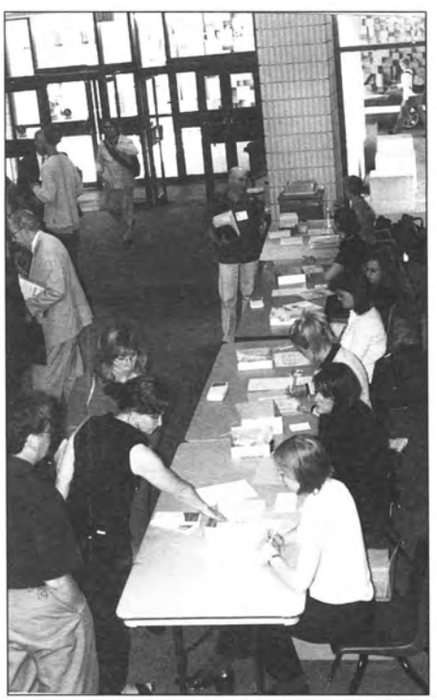
Figs. 1-4: Participants, faculty and university staff constantly busy even during breaks with rare exceptions, of course … (see fig. 5).

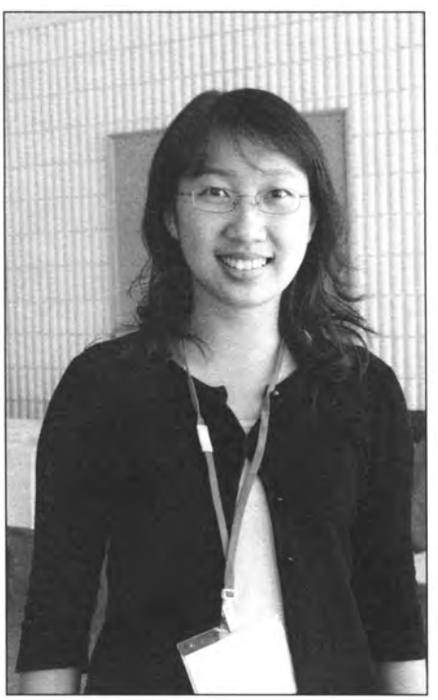
2

5

"The Natural City" Symposion volunteers: Students and staff

Figs. 1-4: Participants were enormously helped by the organizing committee, Bhavnita Mistry and Donna Workman, who were constantly available at the registration desk for the duration of the Symposion, and by student volunteers who processed registrations, answered questions and provided guidance over the course of the three-day event.





The Program of WSE Meetings in Toronto

22-26 June, 2004

WSE members arrived a day before the start of "The Natural City" Symposion (Tuesday, 22 June) and left Toronto a day after the end of the Symposion (Saturday, 26 June).

The overall program was as follows:

Tuesday, 22 June

12:15-14:30	Arrival. Reception and lunch by courtesy of Dr Ingrid Leman Stefanovic, Chair of the Symposion
14:30-18:30	Joint meeting of Executive Council and other WSE members to discuss the 2005 Symposion on "Globalization and Local Identity" in Hikone, Japan (see p. 303)
20:00-22:00	Working dinner of WSE committees

Wednesday, 23 June

9:00-12:15	**Symposion on "The Natural City"**
12:15-13:15	WSE members' working lunch (see pp. 304-305)
13:15-16:30	**Symposion on "The Natural City"**
17:00-19:00	Official dinner
19:30-20:30	Keynote Address by Robert Kennedy, Jr. (see pp. 11-13)

Thursday, 24 June

9:00-12:15	**Symposion on "The Natural City"**
12:15-14:00	WSE members' working lunch
14:00-17:15	**Symposion on "The Natural City"**
19:30	The C.A. Doxiadis Lecture by the Hon. David Crombie (see pp. 14-19)

Friday, 25 June

9:00-12:15	**Symposion on "The Natural City"**
12:15-14:00	WSE members' working lunch
14:00-17:00	**Symposion on "The Natural City"**
21:00-23:00	Farewell dinner

Saturday, 26 June

Morning	Ad hoc meetings of WSE committees
	Departure of participants

Welcome reception of WSE members and lunch

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Figs. 1 and 2: Dr Ingrid Leman Stefanovic, Chair of the Symposion, with daughter, Tamara (left), and Alexander B. Leman (right), President of the World Society for Ekistics, welcoming WSE members.
Figs. 3 and 4: Lunch at the Faculty restaurant, University of Toronto.

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WSE Executive Council meeting, Tuesday, 22 June, 2004


Figs. 1 and 2: President Alexander B. Leman (left) and P. Psomopoulos, Secretary General, discussing the items on the agenda.

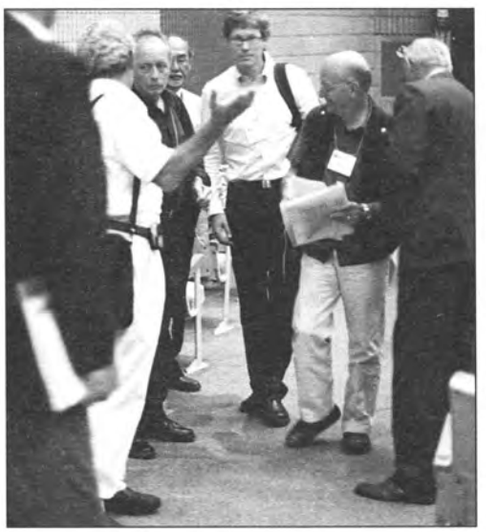

Figs. 3 and 4: Dr Ingrid Leman Stefanovic briefs WSE members on "The Natural City" Symposion.


Figs. 5 and 6: Professor Takashi Doi reports on progress of work concerning the forthcoming 2005 Symposion on "Globalization and Local Identity" to be held in Hikone, Japan, in September 2005.

Daily meetings of WSE members between sessions





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Daily working meetings of WSE members during the lunch break

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Each article with its full title is recorded upon three lines and cross-indexed by author, country, and up to four keywords indicating its main contents – by ekistic unit, ekistic element, historical period, and geographical location.

These keywords are followed by one or more letters to indicate the contents of each article further in terms of diagrams, illustrations, maps, references, statistical tables, etc. (see p. 295).

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250 Environmental management: Theoretical inputs of ecology — The guest editor's introductory statement *Andreas Y. Troumbis*
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260 The Sustainable Biological Initiative *Ecological Society of America*
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311 The United Nations Conference on Environment and Development *United Nations*
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313 After Rio: The planet and the Mediterranean *Serge Antoine*
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316 Megaprojects, environmental management and post-industrial urban illusions *Joseph Wayne Smith*
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329 The basics of community ecology *Richard L. Meier*
"Planners and designers of the future ... need to gain access to ... knowledge about the ecosystem and resource use from outside the ranks of their own professions in order to bring together top-down directives and bottom-up initiatives ..."

338 Economics/ecology: Ecology/economics *Garrett Eckbo*
The need "... to invent a new Environmental Economics, which should not be too difficult inasmuch as the current business economics were invented very recently, and are constantly being re-invented."

343 Education for a sustainable environment *Erica Mann*
The need for a lifelong formal and non-formal education starting from pre-school level on basic principles that lead to balanced and constant communities in terms of both natural and man-made environmental aspects in their totality.

349 Marine fish culture and pollution: An initial Hong Kong empirical study *Lawrence Wai Chung Lai*
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358 Ekistic grid index
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361 Cumulative Index of Contents of EKISTICS, January-December 1992 (vol. 59)

Cover: Schematic representation of characteristic spatial and temporal scales for physical and biological processes on land and in the sea (see Andreas Y. Troumbis: "Environmental management: Theoretical inputs of ecology," fig. 2, p. 253).

Seven of the papers in this issue were collected or solicited by Andreas Troumbis, guest-editor, and the other seven by ACE in consultation with the guest-editor. P. Psomopoulos did the final editing in collaboration with the guest-editor and in consultation with the authors. R.J. Rooke provided editorial assistance, Alex Freme-Sklirou proofread the texts, Dora Spiliou was responsible for typesetting, Angela Iliadi-Moschona for graphics, Myrto Moutli for the photography, and Despina Moutsatsou and Christos Kossidas for the final dummy from a maquette by the editor.

EKISTICS / ΟΙΚΙΣΤΙΚΗ: the problems and science of HUMAN SETTLEMENTS
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115 The editor's page
The increasing importance of landscape design and planning in enhancing the quality of life and contributing to the solutions of major environmental problems of the globe.

116 A landscape basis for planning *Brian Hackett*
"If only there existed a determination to accept the indications of the landscape basis, technological developments would have to be judged on how they fit into the landscape instead of being allowed to dominate it, and would then need to be restricted so as to take their place in a balanced environment."

119 The current role and method of landscape architects in Japan *Shintaro Sugio*
The rapidly expanding spectrum of types of projects with the key involvement of landscape architects — from theoretical and technical research, planning and design to Environmental Impact Analysis and management — through public and increasingly private initiatives.

124 The vital role of the landscape architect in solving environmental problems of the earth *Derek Lovejoy*
The increasing complexities of landscape architecture and landscape planning has necessitated the introduction of ever more sophisticated technology as a tool to carry out surveys, to analyze problems and to record solutions to key problems of the earth's environment at all scales: The case of developing countries.

127 Shaping local, national and regional landscapes *Haruto Kobayashi*
"... basic principles that .. knowledge, time and experience [reveal] as fundamental prerequisites for any landscape intervention to be appropriate and successful [as in the case of selected international exposition sites] at the local and national scale": future priorities at the regional and global scale.

136 Urban and rural landscape developments in Canberra *Margaret Hendry*
Further to "... the provision of safe and attractive living environments, through a disciplined approach to town planning ... the treatment of space and the allocation of open land for public use, both used in an integrated manner within and surrounding all Canberra's urban components [resulted in] the provision of two thirds of the Australian Capital Territory ... for a National Capital Open Space System ... within which all hydraulic and other urban services have been progressively incorporated to provide appropriate and complementary environmental land uses."

152 Landscape planning in the Osaka metropolitan region, Japan *Kimio Kondoh*
Planning policies, principles and priorities "for the development of a systematic network within the framework of the 'Parks and Greenery in the Osaka Metropolitan Region' project," the year 2000 and 2010: "From 'Parks within Cities' to 'Cities within Greenery.' "

159 Ecological structure of Lisbon *Maria Raposo de Magalhães*
"The concept of the 'continuum naturale' ... 'the continuous system of natural occurrences which forms the basis for wildlife and the maintenance of genetic potential and which contributes to the balance and stability of the national territory.' " as applied in an environmental study, part of the Green Structure Plan within the framework of the Lisbon Municipal Directive Plan.

167 Redditch New Town – A landscape case study *Roy Winter*
"... the response to the landscape qualities of the site has resulted in the creation of a town which is not only aesthetically satisfying but is a place where the quality of life is improved because of respect for its total ecology."

176 Urban land restoration on the water's edge: Case studies in Boston *Carol R. Johnson*
Successful "approaches to design and restoration of degraded dump sites as public open space": the cases of Mystic Reservation, Old Harbor Park, as well as John F. Kennedy Park and Lechmere Canal Park, both expansions of the Charles River Reservation in the Greater Boston Area.

183 Residential marinas: The case of Hythe Marina Village *Michael Oldham*
"The experience of living directly adjacent to water ... the 'drive in-sail out' house and mooring ... [t]he high quality of the architecture and landscaping and the meticulous attention to the detail of spaces and their components, create a memorable impression and a beautiful environment in which to live, work and play" — a case of 225 houses, 500 marina berths and all needed services and facilities developed which started in 1982 on the south coast of England as inspired by Port Grimaud in France.

190 Land suitability for recreational activities in the Prespa Lakes National Park, Greece *Ioannis A. Tsalikidis*
Identification of the potential for the development of tourist related activities such as walking, climbing, camping and swimming, in a natural reserve of extreme sensitivity "through a method ... based ... on logical combinations of parameters" — such as "land use, accessibility to road network, slope, exposure, and altitude — to enable the planner to thoroughly comprehend the rules which are set" and to provide more objective means of evaluation of opportunities, conflicts, and risks.

196 Water in physical planning: Handling a resource of aesthetic, environmental and pedagogical importance *Lars Nyberg*
"Systems for local management of stormwater and nitrogen retention ponds" not only constitute a means of solving technical problems, but are also "excellent opportunities for arranging attractive water features adding beauty and biological richness to our green spaces [and] a pedagogical means for increasing engagement in preserving our environment."

201 Obstacles to aesthetics *Robert H. Mortensen*
"... most people ... [and] [t]hose of us in the design and planning profession ... aspire to provide livable cities and personal environments that are fun, livable, cost-effective and achievable ... Yet ... the results of our efforts today [are not] the most desirable places to spend time [as the older parts of communities are] because of the charm, the human scale and the ambience" prevailing there; the negative and limiting role of the "current mass of ordinances and regulations" as, for example, in the case of enforcing a highway standard, which lines the "massive and competing signage messages," as well as the process of planning where learning from past achievements and from people is ignored.

204 Jakarta's Monas Park through the ages *Jusna M. Amin*
"Monas Park now becomes a great public landscape ... preserved and developed not only to pay homage to the past, but also to be the pride of the nation and people of Indonesia and the citizens of [the capital city] ... at present and in the future."

215 Towards a model for an urban park in South Africa *Graham Young*
"In reaction to ... problems and perspectives [prevailing in the country], drawing on a cross-referencing of theory, ... urban park design and planning [should] incorporate social values; . . encourage community participation; capitalize on the nature of the [site and appropriate] ecological principles; strive for safe environments; and ensure financial feasibility": cases of successful implementation in Pretoria and Johannesburg.

225 Ekistic grid index
Indicative presentation of contents by article, in terms of ekistic elements, ekistic units, time, and key issues discussed.

Papers in this issue are a selection from a large number of documents solicited and compiled by the editor in close collaboration with George L. Anagnostopoulos who, in his capacity as President of the International Federation of Landscape Architects (IFLA), was instrumental in conceiving and planning the special research and documentation effort undertaken by ACE, which is reflected here. P. Psomopoulos was responsible for editing the papers, in consultation with the authors. R.J. Rooke provided editorial assistance, Alex Freme-Sklirou proofread the texts, Dora Spiliou was responsible for typesetting, Angela Iliadi-Moschona for graphics, Myrto Moufli for the photography, and Despina Moutsatsou and Christos Kossidas for the final dummy from a maquette by the editor.

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Volume 61, Number 364/365, January/February-March/April 1994

The landscape: Design and planning – 2

2 The anthropocosmos model
Indicative presentation of themes emphasized in the present issue, in terms of scale, time, income group, interconnection of ekistic elements and desirability/feasibility.

3 The editor's page
The tasks ahead of landscape planning and design in enhancing human habitats and harmonizing development with natural ecosystems.

4 A framework for theory and practice in landscape planning *Carl Steinitz*
Six types of question, each considered as "a level of inquiry relating to a theory-driven modeling type ... based in usable and valid ... theory" and in "management of information" with the help of GIS: the case of the "Alternative Futures for the Snyderville Basin, Summit County, Utah, USA" project.

10 Landscape planning and water management in the Netherlands *Meto J. Vroom, Klaas Kerkstra, Michael van Buuren and Wim T. Wassink*
"... the effects of water management on environmental quality in the Netherlands in general, and on landscape amenity and nature conservation in particular": "... the relation between hydrological systems, land-use patterns, and the physiognomy of" the Regge and Dommel rivers' stream valleys and "proposals for changes in land-use patterns or, alternatively, in water flow systems" aiming "at a separation of types of land use and water flows of different quality, the retention of water during dry seasons and the purification of polluted water" and leading towards "a viable and sustainable landscape structure."

22 The city should be rich in the pleasures of wild nature – A traditional aesthetic concept of China for urban planning *Sun Xiao Xiang*
The fact that "People live in the large cities just like birds in splendid golden cages ..." longing "for green grass, wild flowers, blue sky, murmuring streams, woodlands and singing birds" proves that the traditional response to "the 'call of wild nature!' " and the preaching of the aesthetics of nature on philosophy, literature, music, and landscape gardening "may be of some use to the modern landscape planners and designers of China or other countries."

29 Landscape planning and ecology *G.K. King'oriah*
"We are now on the threshold of attaining rational management of our activities, and creating an environment that will not only protect the highest values of our culture and nature, but also add new concepts which will be combined to form one discipline" — the discipline of landscape planning which advocates systematic methodologies and knowledge — "that will perpetuate informed perturbation of the existing ecosystems within the biosphere."

33 Sustainable landscapes through spatial organization of green spaces in rural regions *Yoritaka Tashiro*
Research work on the definition of a green open land region's typology in arid and semi-arid regions of Northern Pakistan, in view of "harmonizing human settlements with the natural environment" through environmental and landscape planning.

38 Types of Lithuanian landscape as a basis for urban development *Regimantas Pilkauskas and Alvydas Zickis*
The use of a comparative landscape evaluation method in planning and designing urban expansion in Vilnius and Kaunas, the two largest Lithuanian cities: the cases of clayey plains, hilly uplands and river valleys.

47 Green open space to improve air quality in metropolitan Jakarta *Ning Purnomohadi*
The use of "the Urban Dynamic System and Spatial Analysis System ... to analyze and develop simulation models and sub-models to describe the impacts of urban air pollution dynamics on Urban Green Open Spaces, and vice versa": the cases of transportation, industrial zones and residential areas in Jakarta.

59 Neugebäude Palace and its gardens: The green dream of Maximilian II *Alfred Lesel*
The evolution in design and implementation of planning "the most important masterpiece of Renaissance horticultural landscaping" in Vienna, Austria.

68 Cultural landscapes *Carmen Añón*
The world effort in defining guidelines for the declaration of new sites of cultural landscapes to be included in the World Heritage List: countries' response, experts' initiatives and promotion for future action.

71 Landscaping in Italy: The parks of North Tiber and Collalto Sabino Castle *Lidia Soprani*
"In both projects, different as they are from one another in almost every respect, an effort has been made to adopt a scale of values in which the 'human' or 'man-made' dimension — which is strongly present anyway — is conceptually subordinated to a series of other elements belonging to 'nature',": the "use of existing qualities or preserving the quality potential" in facing basic problems in Italy — a country with extensive historic heritage where external and internal pressures might otherwise cause inevitable destruction.

80 A landscape approach: Constituting and taming heterogeneity *Bernard Lassus*
"... the aim of the work of the planner — be he an urbanist, landscape architect, or colorist — is to clarify the different important factors and also the hierarchy of the scales relative to the places where he works, which are often confused before the intervention": a footbridge for children, a public garden, a motorway rest area, and some cases of painting housing schemes.

90 Children, green areas and the sense of community in Mexico City *Concepción Laguna de Ojeda*
Research in the green areas and open areas of Mexico City confirms that children increasingly frequent a variety of types of play areas, where conditions such as "accessibility from housing to the green area; security in the neighborhood; and landscape architectural design, favoring play activities" are fulfilled.

94 The planning of recreational regions in Lithuania *Vladas Stauskas*
Theoretical planning concepts and applied planning efforts of the Department of Land Management of the Institute of Architecture and Construction, Lithuania, in developing the national territory jointly considering "the network of towns and the network of natural resources for recreation" and tourism within a natural, technogenic and touristic-recreational framework.

100 Planning and managing the urban fringe landscape *George L. Anagnostopoulos*
The problems of uncontrolled development and severe environmental degradation of unbuilt areas on the edge of cities, especially in the Third World and the primordial utility and importance of these rural or semi-rural zones of natural landscape for recreation, relaxation or escape for frustrated urban dwellers and for more direct contact with nature.

105 Community forests in England and Wales *M.F. Downing*
The important economic and social role of the decision to develop twelve Community Forests and a national forest as part of the effort to increase the amount of forest land in England and Wales, having as objectives "production of timber; visual improvement of the environment; creation and enhancement of wildlife habitat; improvement of recreation opportunities; and the expansion of user capacity in areas where there are likely to be many visitors."

115 Renewal in rural Luxemburg *John Weier-de Haas*
The concept and anticipated process of action for rural revitalization "as an all-encompassing cultural movement, dealing with a wide range of issues, from educational and publicity work to the re-shaping of basic aspects of rural life in ways which are socially and environmentally acceptable."

120 Edges *James Bischoff*
"... those of us whose minds dwell on landscape are most fascinated by the edges — by the edge of one ecosystem juxtaposed to another ecosystem, one metaphorically filled landscape almost tactically rubbing against or framing another. ... The most moving edge to my consciousness is the juxtaposition of rock and water — the sea and the land — two so different states of being."

124 Ekistic grid index
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ISSN 0013-2942; 2005 Volume 72.

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ISSN 0013-2934; 2005 Volume 39.

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15. S. Dakaris, *Thesprotia* (in Greek, 1972, 356 pp., 71 illus.) $53.00
16. D. Lazaridis, *Maroneia and Orthagoria* (in Greek, 1972, 140 pp., 40 illus.) $30.00
17. I. Travlos, M. Petropoulakou, E. Pentazos, *Athens, Ekistic Elements — First Report* (in Greek, 1972, 84 pp., 26 illus.) $23.00
18. A. Zois, *Crete — Stone Age* (in Greek, 1973, 363 pp., 22 illus.) $57.00
19. N. Faraklas, *Hermionis-Halias* (in Greek, 1973, 138 pp., 36 illus.) $30.00
20. D. Lazaridis, *Philippi — Roman Colony* (in Greek, 1973, 106 pp., 20 illus.) $30.00
21. M. Petropoulakou and E. Pentazos, *Attica, Ekistic Elements — First Report* (in Greek, 1973, 270 pp., 32 illus.) $53.00
22. J.W. Sperling, *Thera and Therasia* (in English, 1973, 95 pp., 39 illus.) $27.00
23. A. Petronotis, *Megale Polis of Arkadia* (in Greek, 1973, 448 pp., 18 illus.) $57.00
24. I. Kondis, *Lesbos and its Peraia* (in Greek, 1978, 564 pp., 63 illus.) $75.00

DOCUMENTATION REPORTS

D1. Union Catalogue of Scientific Periodicals in Greek Libraries (in English and in Greek, 1971, 790 pp.) $150.00

BOOKS BY C.A. DOXIADIS

1. *Anthropopolis, City for Human Development* (in English, 1974, 393 pp., 161 illus.) $60.00
2. *Ecumenopolis, the Inevitable City of the Future* (with John G. Papaioannou) (in English, 1974, 469 pp., 151 illus.) $75.00
3. *Building Entopia* (in English, 1975, 331 pp., 293 illus.) $60.00
4. *Action for Human Settlements* (in English, 1976, 207 pp., 77 illus.) $45.00

Note

ACE : Athens Center of Ekistics
COF : "City of the Future" Research Project
COG : "Capital of Greece" Research Project
HUCO : "Human Community" Research Project

These publications, though in very limited supply, can be obtained from the Athens Center of Ekistics, 24 Strat. Syndesmou Street, 106 73 Athens, Greece. Price in US$ includes mailing cost (surface mail).

EKISTICS (modern Greek: ΟΙΚΙΣΤΙΚΗ) is derived from the ancient Greek adjective *οικιστικός,* more particularly from the neuter plural *οικιστικά* (as "physics" is derived from *φυσικά,* Aristotle). The ancient Greek adjective *οικιστικός* meant: "concerning the foundation of a house, a habitation, a city or a colony; contributing to the settling." It was derived from the noun *οικιστής,* meaning "the person who installs settlers in a place." This may be regarded as deriving indirectly from another ancient Greek noun, *οἴκισις,* meaning "building," "housing," "habitation," and especially "establishment of a colony, a settlement or a town" (already in Plato), or "filling it with new settlers": "settling," "being settled." All these words grew from the verb *οικίζω,* "to settle," and were ultimately derived from the noun *οἶκος,* "house," "home" or "habitat."

The *Shorter Oxford English Dictionary* contains a reference to an *oecist, oekist* or *oikist,* defining him as: "the founder of an ancient Greek ... colony." The English equivalent of *οικιστική* is *ekistics* (a noun). In addition, the adjectives *ekistic* and *ekistical*, the adverb *ekistically,* and the noun *ekistician* are now also in current use. The French equivalent is *ékistique,* the German *ökistik,* the Italian *echistica* (all feminine).