

RIHN 9th International Symposium

Living in the Megacity:
The Emergence of Sustainable Urban Environments

June 25-27, 2014
Kyoto, Japan

Organized by

The Research Institute for Humanity and Nature (RIHN)
National Institutes for the Humanities (NIHU)
Inter-University Research Institute Corporation

PREFACE

Background

In 2008 it became evident that over half of the world's population resided in urban settings. Taken together with growing awareness of the over-consumption of resources by city residents and serious damage on the global environment as a result of carbon dioxide emissions, the news was shocking to many. The rapid economic growth of two of the most populated nations in the world, China and India, is also a big concern. While the media tend to emphasize the negative impacts of urban life ways on the global environment, we need to remember that many residents in megacities, especially in developing countries, live in poverty. These individuals are vulnerable to the results of climate change, such as resource depletion, flooding and sea level rise. Megacity residents are the first to be impacted by both global and local environmental problems, even as they receive significant social and economic benefits from urban life.

RIHN Megacity Project

Eighteen cities in the world now have a population of more than ten million people. Most of them are located in developing countries in tropical or temperate zones. These cities have created unprecedentedly intricate patterns of human-environmental interaction, each having massive influence on other cities and on the global environment. The Research Institute for Humanity and Nature (RIHN), Kyoto, Japan, is a home for a wide range of trans-disciplinary projects conducted in order to understand mutual relationships between humans and environments. Among them is the RIHN Megacity Project that began in 2009. Focusing on Jakarta, one of the 18 megacities, this six-year research project has mobilized approximately 100 researchers with diverse fields, including sciences, history and other social sciences and engineering, to identify how to mitigate global environmental problems while improving the quality of local peoples' lives.

SESSION PROGRAM

Main Theme and Symposium Outline

Building upon Megacity Project findings, this symposium brings together prominent scholars from around the world to discuss how large cities can become sustainable. The main theme of this international symposium is the prospect of sustainable Megacity futures, with a focus on intra- and inter-city diversity. This symposium consists of three sessions. Focusing on the causes, conditions, and consequences of the growth and decline of past cities and cultures, the first session aims to identify aspects of urban resilience from a historical perspective. The second session engages in an interdisciplinary discussion on the ways in which cities and non-cities can coexist through various partnerships. Discussion of the third session revolves around the definitions of sustainable cities as well as the question of how to evaluate their sustainability, through which we present future visions of desirable cities.

Life in the Megacity

Our belief is that living wisely in a megacity could become one of the most important dimensions of sustainability in the global environment. Such lifeways are not immediately self-evident, however. They must be discovered based on the wisdom of the past and discussion of urban-rural coexistence. The ultimate goal of the symposium is to work together to find a philosophy for living wisely in megacities, one which will encourage the future prosperity of humanity and its coexistence with the global environment.

Session 1 Lessons from Research with Long-Term Historical Perspective: The Rise and Fall of Cities

Unlike simulation studies, historical analysis can reveal regionally different trajectories of cities and civilizations through time. In particular, anthropological archaeology can examine the co-relations of environmental, economic, social and political factors on the basis of excavated materials. By inferring structural similarities between the past and the present, we can predict regionally different trajectories of human-environmental relationships through time. Presenters in Session 1 examine causes, conditions and consequences of the growth and decline of past cities and cultures from different theoretical perspectives. Key themes include the possible contributions of historical analysis to the future potential of cities considered in their global environmental context.

Session 2 Lessons from “Urban Interaction Spheres”: Adapting to Local Environments and Reducing Environmental Loads

Cities do not consist of architecturally developed lands alone. In particular, megacities in emerging countries of Monsoon Asia have been rapidly growing by encompassing open and cultivated lands. These megacities coexist and interact with smaller surrounding communities, which are based on farming, fishing, logging and other forms of small-scale resource management and use. We call this zone “the urban interaction sphere,” a unit of research for developing and understanding how cities can coexist together with the global environment. In this session, case studies of urban interaction spheres from around the world are presented. Successful reduction of environmental loads and new ways to adapt to certain environmental loads are discussed, based on which the future potential of the global environment and cities are explored.

Session 3 Lessons from Global Perspectives: Designing Sustainable Cities

In order to understand how cities become sustainable, comparative studies between cities are indispensable. In recent years, various urban assessment indices have been proposed. Many issues in these indices have yet to be resolved, however, including delays in establishing data management structures at each municipal unit, inconsistency in evaluation criteria, and the lack of systematic applications of these indices to urban policies. Invited experts in urban assessment index construction and urban-related data collection to identify and design characteristics of sustainable cities and address the obstacles.

PROGRAM

Wednesday June 25, 2014

Opening Session

Chair: **Steven R. MCGREEVY** (RIHN)

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| 10:00-10:05 | Opening Remarks
YASUNARI Tetsuzo (Director-General, RIHN) |
| 10:05-10:25 | Objectives of the Symposium
MURAMATSU Shin (RIHN) |
| 10:25-11:25 | Keynote Address 1
The Management of Urbanization, Development and Environmental Change in the Mega-Cities of Asia in the Twenty First Century
Terence G. MCGEE
(The University of British Columbia, Canada) |
| 11:25-11:35 | Coffee Break |
| 11:35-12:35 | Keynote Address 2
Feeding the Megacities and Urban-Rural Linkages
Parviz KOOHAFKAN (President, World Agricultural Heritage Foundation / U.N. Food and Agriculture Organization (retired)) |
| 12:35-13:40 | Lunch |

Session 1 Lessons from Research with Long-Term Historical Perspective: The Rise and Fall of Cities

Chairs: **HABU Junko** (RIHN) & **UCHIYAMA Yuta** (RIHN)

- 13:40-13:50 Session Objectives
UCHIYAMA Yuta (RIHN)
- 13:50-14:20 Landscape Transformation in Theorizing Societal Collapse
William BALÉE (Tulane University, USA)
- 14:20-14:50 Resilience and Cities: Some Historical Perspectives
Mark J. HUDSON (Nishikyushu University, Japan)
- 14:50-15:20 Islamic Cities and Megacities: Studying Regions and History
FUKAMI Naoko (Waseda University, Japan)
- 15:20-15:40 Coffee Break
- 15:40-16:10 The Rise and Fall of Cities in Prehistory: An Example from the Indus Civilization
Steven WEBER (Washington State University Vancouver, USA)
- 16:10-16:40 Teotihuacan: Origin, Urban Impacts, and Legacy of an Ancient City
SUGIYAMA Saburo
(Aichi Prefectural University, Japan / Arizona State University, USA)
- 16:40-17:10 Discussion
- 18:00- Reception

Thursday June 26, 2014

Session 2 Lessons from “Urban Interaction Spheres”: Adapting to Local Environments and Reducing Environmental Loads

Chairs: **ISHIKAWA Satoshi** (RIHN) & **MIMURA Yutaka** (RIHN)

- 9:30-9:40 Session Objectives
MIMURA Yutaka (RIHN)
- 9:40-10:20 Landscape Ecological Urbanism in Southeast Asia: A Strategy to Create New Urban Territories that Reflect Cultural and Natural Processes
MURAKAMI Akinobu (University of Tsukuba, Japan)
- 10:20-11:00 Human Utility of Marine Ecosystem Services and Behavioral Intentions for Marine Conservation: Implications for Urban-Suburban Partnership
YAGI Nobuyuki (The University of Tokyo, Japan), **WAKITA Kazumi** (Tokai University, Japan), and **ARAI Ryoko** (The University of Tokyo, Japan)
- 11:00-11:20 Coffee Break
- 11:20-12:00 Hometown Investment Trust Funds: New Financing Methods to Link Urban Centers and the Regions, and their Possibilities
AKAI Atsuo (Music Securities, Inc., Japan / Waseda University, Japan)
- 12:00-12:40 The Sanitary to Sustainable to Sacred City: Urban Nature Experience and Engagement
Kathleen L. WOLF (University of Washington, USA)
- 12:40-13:10 Discussion
- 13:10-14:10 Lunch

Session 3 Lessons from Global Perspectives: Designing Sustainable Cities

Chair: **HAYASHI Kengo** (RIHN)

- 14:10-14:20 Session Objectives
HAYASHI Kengo (RIHN)
- 14:20-15:00 Visualization of City Sustainability Index (CSI): What is City Sustainability?
How Can we Assess City Sustainability?
MORI Koichiro (Shiga University, Japan)
- 15:00-15:40 An Analysis of the Use of Urban Sustainability Indicators: Lessons from
Cities of Quebec
Georges A. TANGUAY
(Université du Québec à Montréal, Canada / CIRANO, Canada)
- 15:40-16:00 Coffee Break
- 16:00-16:40 Sustainability and the Urban Functions from the Perspective of the
Global Power City Index
ICHIKAWA Hiroo (Meiji University, Japan)
- 16:40-17:20 Essence of City Prosperity Index: A Measuring Tool a Policy Dialogue
Eduardo LÓPEZ MORENO (UN-Habitat, Kenya)
- 17:20-18:00 Discussion

Friday June 27, 2014

Session 4 Synthesis and Discussion Futurability of Cities and Global Environment

Chairs: **MURAMATSU Shin** (RIHN) & **Daniel NILES** (RIHN)

- 10:00-10:15 Synthesis of Session 1
HABU Junko (RIHN)
- 10:15-10:30 Synthesis of Session 2
ISHIKAWA Satoshi (RIHN)
- 10:30-10:45 Synthesis of Session 3
HAYASHI Kengo (RIHN)
- 10:45-11:05 Coffee Break
- 11:05-11:45 Discussion
Comments from Keynote Speakers
- 11:45-11:50 Closing Remarks
SATO Tetsu (Deputy Director-General, RIHN)
- 11:50-12:25 Publication Meeting
- 12:25- Optional Tour

Keynote Address

The Management of Urbanization, Development and Environmental Change in the Mega-Cities of Asia in the Twenty First Century

Terence G. MCGEE

The University of British Columbia, Canada

Terry G. MCGEE is a professor emeritus, Institute of Asian Research, University of British Columbia, Canada. He has been carrying out research on urbanization in Asia with particular focus on Southeast Asia for more than fifty years. He has published more than 30 books, monographs and reports and 200 articles including "The Southeast Asian City" (1967), "Urbanization Processes in the Third World: Essays in Search of a Theory" (1971), "Theatres of Accumulation: Case Studies of Urbanization in Latin America and Asia" (1985, co-authored with W. Armstrong), "The Extended Metropolis: Settlement Transition in Asia" (1991, co-edited with N. Ginsburg), "The Mega-urban Regions of Southeast Asia: Policy Challenges and Responses" (1995, jointly edited with I. Robinson), and most recently "Urban Space in China: Development under Market Socialism" (2007). He has taught at Victoria University, Wellington, New Zealand, the Universities of Malaya, Hong Kong, the Australian National University, and the University of British Columbia, Vancouver. He was a director of the Institute of Asian Research at the University of British Columbia, Canada from 1978 to 1988 and 1993 to 1998 as well as a professor of geography from 1978-2001. He has been a senior advisor on urban policy in Bappanas, (Central Planning Agency) in Indonesia and carried out consultancies in the field of urban development for IDRC and CIDA (Canada) in Southeast Asia, China and Brazil, ESCAP (Bangkok), UNDP, Asia Development Bank and United Nations University. He has been a member of the expert panel on urbanization in developing countries (National Academy of Sciences, U.S.A.) and was appointed to the International Geographic Union's taskforce on mega-cities. He was elected the president of the Canadian Association of Geographers in 1989. He received the "Award for Scholarly Distinction in Geography" of the Canadian Association of Geographers in 2000. In 2009 he was awarded the "Vautrin Lud International Prize in Geography" under the auspices of the International Geographical Union for his contributions to development geography. This is the highest international award that can be gained in the field of Geography. tmcgee@geog.ubc.ca

Abstract

This presentation argues that the challenges presented by global environmental change, a rapidly urbanizing world, the reshaping of world energy systems in the face of a "peak oil scenarios", economic restructuring in response to increasing global economic volatility and problems of societal adjustment create a situation in which new ideas are needed to develop policy solutions to these challenges. In particular there is a need to recognize that the ideas we have used to interpret the urbanization process in the nineteenth and twentieth centuries should be recast to reflect the new realities of the twenty-first century. These previous ideas have become dysfunctionally embedded in the present; a fact that becomes even more important as the Asia becomes more urbanized.

The presentation is organized into three parts in order to present the arguments in support of this claim.

- 1) the need to understand the importance of urban places in creating a "globally responsible" urbanization environment's in which sustainable, livable, economically productive and socially inclusive urban places are a feature. Part of this understanding is based upon the fact the

processes such as spatial growth, the numbers of population engaged in the urban transition and the rapidity of economic change are different from the earlier phases of urbanization. In particular it is the mega-urban regions of Asia that are the focus of these challenges.

- 2) the need to create resilient and adaptive urban places as “arenas” for developing both technological and institutional innovation that enable the development of sustainable cities. This involves recognizing the spatial, social and economic diversity of the mega-cities in order to develop policy responses at various levels of government that involve coalitions between national and local governments, the private sector and “civil society”
- 3) In particular there is a need to develop new forms of government governance and management that are capable of implementing policies that emphasize sustainability and resilience that enable Asian mega-urban regions to manage the challenges of the 21st Century. This is illustrated by comparing the provision of urban services in the emerging mega-urban regions of Kuala Lumpur and Jakarta.

The conclusion is that creating “globally responsible” urban places is no simple task given the size of the challenges that Asian policy makers face, but it can be accomplished if outmoded ideas can be discarded in the face of the realities of the 21st century.

Keynote Address

Feeding the Megacities and Urban-Rural Linkages

Parviz KOOHAFKAN^{1 2}

1. *FAO, Italy*

2. *World Agricultural Heritage Foundation*

Parviz KOOHAFKAN is a senior advisor at the U.N. Food and Agriculture Organization and a honorary senior research fellow at Bioversity International. He is the founder and the president of the World Agricultural Heritage Foundation and the pioneer of the UN Partnership Initiative on “Conservation and Adaptive Management of Globally Important Agricultural Heritage Systems” (GIAHS). He started his career in Iran as an assistant professor in ecology and then as a professor of forest ecology in Ecole National du Génie Rural des Eaux et Forêts in Montpellier, France. He has held several senior positions in FAO, including serving as a director of the Land and Water Division, the Climate Change and Bio-energy Division, and the Rural Development Division in the Sustainable Development Department. He has an engineering degree in agronomy and Natural Resources Management from University of Teheran, Iran, and a MA in applied ecology and a Ph.D. in terrestrial ecology from the University of Sciences and Techniques of Montpellier, France. He is the author of several books and publications on biodiversity, agro-ecology, natural resources management, climate change and sustainable development. His most recent works are “Food and Wisdom” (2012, FAO and Bioversity International), “The State of the World Land and Water Resources for Food and Agriculture: Managing Systems at Risk” (2011, FAO), and “Enduring Farms: Climate Change, Smallholders and Traditional Farming Communities” (2008, Third World Network, co-authored with Miguel Altieri). *parvizkoobafkan@gmail.com*

Abstract

Urbanization is one of the key drivers of change in the world today and feeding humanity, the majority of which now lives in cities, involves a complex system of ecological, social and economic relationships. The world’s urban population currently stands at around 3.5 billion and will almost double to more than 6 billion by 2050. This is a challenge not only for urban areas but also for rural areas, because many people, especially the young, are migrating from rural to urban areas. In addressing the challenges of urbanization, we are therefore also addressing, directly or indirectly, rural and territorial development.

What do we have to do to ensure access to healthy and nutritious food in cities? What infrastructure is needed and what kind of food production is possible in cities? How can cities preserve the services of their surrounding ecosystems? Such food system issues have often not been seen as critical to urban design, planning, or management. The perception has been that the food is there and one can easily buy it in the supermarkets or along the streets. This perception was altered for many in 2008, when food prices peaked. More than 20 countries around the world experienced food riots in urban areas. Hunger has become a volatile issue in both rural and urban contexts, and has changed the political scene.

Urban food and nutrition security cannot be taken for granted, as it is related to a complex system; supporting the most vulnerable groups in an urbanizing world demands discussions on food, agriculture and cities in the context of rural-urban linkages. The diverse array of present food systems is changing rapidly on a global scale and will be transformed even more rapidly in the

coming decades. This transformation has become a major issue for debate amongst traditional and non-traditional actors and institutions, including national governments, research institutions, mayors, planners, producers, private sector, social movements, U.N. agencies, and civil society organizations in high, medium and low-income countries. All parties to the debate are increasingly concerned with the impacts of food price volatility and climate change on food systems.

Amidst calls for “sustainable intensification” of production, or producing more food with fewer non-renewable inputs and less arable land relative to growing populations, a new paradigm is emerging for ecosystem-based, territorial food system planning. This new paradigm seeks to build diverse supplies of food geographically close to population centers. The goal is not to constrain the global food supply chains that contribute to food security for many countries, but to improve the local management of food systems that are both local and global.

As a result of new multi-sector, multi-stakeholder collaborations, urban and rural authorities and their citizenries can come to better understand their food and ecosystem resources to adapt to multiple challenges and manage more resilient food systems.

Landscape Transformation in Theorizing Societal Collapse

William BALÉE

Tulane University, USA

William BALÉE is a professor of anthropology at Tulane University, where he has taught since 1991. He received the Ph.D. in anthropology from Columbia University (1984). He held earlier appointments at the New York Botanical Garden (1984-88) and the Goeldi Museum (1988-91). His books include “Footprints of the Forest: Ka’apor Ethnobotany--The Historical Ecology of Plant Utilization by an Amazonian People” (1994, Columbia University Press), “Inside Cultures: A New Introduction to Cultural Anthropology” (2012, Left Coast Press), and “Cultural Forests of the Amazon: A Historical Ecology of People and their Landscapes” (2013, University of Alabama Press). His most recent research includes describing the forest composition and structure of the geoglyphs in Western Amazonia and comparing the historical ecology of the Ka’apor (Eastern Amazon) and the Jah Hët (peninsular Malaysia) peoples. *wbalee@tulane.edu*

Abstract

Complex, hierarchical societies—civilizations or states—have both risen and collapsed. Initial progression toward urbanization—and by that I mean increased complexity and hierarchy of a class or caste-based stratification system together with primary landscape transformation—is almost always linked to intensification of resource use via preexisting agrarian means; collapse occurs due to contingencies such as catastrophe (military conquest, epidemic disease and depopulation, forced migration and displacement), overshoot (overexploitation of resources, environmental degradation), climate change, and other well-identified, if controversial, factors. Collapse can lead to innovation also. Less hierarchical forms of both development and collapse are documented both archaeologically and ethnographically, such as the simple shift from foraging to farming, wherein the farming communities are linked heterarchically (that is, without stratification into rich vs. poor groups in the same society). They could be self-organized, yet complex in other ways. One can also identify numerous cases of abandonment of agriculture and adoption of full-time foraging, in both hemispheres. There is no single explanation for all the cases of intensification of landscape transformation vs. societal collapse; rather, it is necessary to study them individually. And not all landscape transformations are destructive of biotic and ecological diversity; in some cases, landscape transformation enhances such diversity. It is also the case, however, that the contingencies are limited, and therefore, explanations of either phenomenon are not wholly particularistic. Similar trends in different regions can be compared analytically and scientifically using the research program of historical ecology.

Resilience and Cities: Some Historical Perspectives

Mark J. HUDSON

Nishikyushu University, Japan

Mark J. HUDSON is a professor at Nishikyushu University (University of West Kyushu) in Kanzaki, Saga, where he teaches anthropology and environmental humanities. He is also a director of the Research Institute for Sustainable Environments and Cultures. He was educated at the University of London (BA, 1986), the University of Cambridge (M.Phil, 1988) and the Australian National University (Ph.D., 1996). His research interests include the archaeology of Japan and the North Pacific, hunter-gatherers, resilience and sustainability, violence and environmental security, ecocriticism, and occupational science. He is currently conducting fieldwork on Miyako Island, Okinawa, and at the Idrija mercury mine and world heritage site in Slovenia. His main publications include "Ruins of Identity: Ethnogenesis in the Japanese Islands" (1999, University of Hawai'i Press), and, as co-editor, "Multicultural Japan: Palaeolithic to Postmodern" (1996, Cambridge University Press), and "Beyond Ainu Studies: Changing Academic and Public Perspectives" (2013, University of Hawai'i Press). He is also a co-editor of volume 1 of the forthcoming "Cambridge World History of Violence." hudsonm@nisikyu-u.ac.jp

Abstract

Although cities have a long history in the human story, originating with agriculture in many regions of the world and reaching back about 10,000 years, there has been comparatively little research on the role of cities in broad-scale and long-term patterns of sustainability and resilience. One reason for this may be that until recently the proportion of humanity that lived in cities was relatively small, only comprising around 3% as late as 1800. The extensive research that exists on the rise and fall of civilizations has included many examples—such as the Roman and Maya empires—where cities were common and important, but most of these studies have analyzed general factors affecting the sustainability of the civilization as a whole rather than focusing on the narrower issue of urban sustainability. Despite the importance of canonical texts that deal with cities, such as Raymond Williams' 1973 *The Country and the City in ecocriticism* and William Cronon's 1991 *Nature's Metropolis: Chicago and the Great West* in environmental history, it would also be a fair comment that the environmental humanities have tended to show more interest in "wild" than in urban natures. Although recent research has increasingly begun to emphasize the ecological aspects of cities, the social side of the urban form has received the most attention.

As a background to the theme of megacities, this paper will provide a historical commentary on the resilience and sustainability of cities over the long-term. Resilience is the capacity of a social-ecological system to absorb shocks and to reorganize to sustain its fundamental functions, structures and identity. Cities are an interesting yet difficult place to study resilience because of the presence of many contradictory features. Cities were both places of "learning, communication, light" (Raymond Williams) and also places of danger and disease, of ambition and alienation. Research within resilience theory has identified various factors that promote resilience, including capacity for self-organization, social and economic diversity, modularity, social capital, innovation, and overlap in governance. The paper will discuss how the resilience of historical cities in Europe and elsewhere relates to these factors.

Islamic Cities and Megacities: Studying Regions and History

FUKAMI Naoko¹, MURAMATSU Shin², YAMADA Kyota³ and UCHIYAMA Yuta²

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2. Research Institute for Humanity and Nature, Japan

3. Graduate School of Asian and African Area Studies, Kyoto University, Japan

FUKAMI Naoko is a researcher in the organization for Islamic Area Studies, Waseda University. She received her Ph.D. in engineering at Yokohama National University (1998). She served as a visiting professor (1999-2001) and a lecturer (2001-2008) at the Institute of Oriental Culture, University of Tokyo, an associate professor (2009-2011) and a professor (2012-2013) at the Organization for Islamic Area Studies, Waseda University. Her major fields of interest are the architectural and urban histories of Islamic and Indian Ocean areas. Her major publications include "Urban Structure of so-called Islamic City" (2003), "The World of Islamic Architecture [世界のイスラーム建築]" (2005, Kodansha Genndai-Shinsho), "The Old Walled City of Shibam and its Surroundings" (2010), "Reports on the Architectural Heritage of Bhadrashwar, Mundra and Mandvi – Studies on the Port Cities of Kutch" (2011), and "Islamic Architecture Viewed from World History [イスラーム建築の世界史]" (2013, Iwanami Shoten). naokofukami@gmail.com

Abstract

The purpose of this article is to show the pluralism in the evolution of urban environments and to examine the resilience of cities. Morphologically, the "Islamic cities" that flourished from the 10th to the 19th centuries under Muslim rulers were high-density and organically enclosed cities. We can see the social and environmental systems that have continuously shaped these Islamic cities over a millennium. With these connections in mind, this article will classify cities according to their climate and history, and address the resilience of the more recent "megacities".

Looking at the rise and fall of cities in terms of morphology and environment, the framework is as follows. The Earth is divided into six regions: the mid-latitude arid zone, monsoon Asia, upper Eurasia, North and South America, sub-Saharan Africa, and Oceania. History is similarly divided into six periods: the early ancient (3500 - 1000 BCE), the late ancient (1000 BCE - 300 CE), the early medieval (300 - 1000 CE), the late medieval (1000 - 1500), the pre-modern (1500 - 1800) and the modern (1800 - today). Using this 6x6 matrix, five recurring patterns of urban development emerge. The first cities were established in the mid-latitude arid zone. These type 1 cities, first appearing around 3500 BCE, were wall-enclosed, high-density, multi-story environments with organic (unplanned) development. The Islamic cities that came later are a sub-category of type 1. From around 1000 BCE, type 2 cities - enclosed, high-density, multi-story cities, but with planned development - became predominant in the mid-latitude arid region. Type 3 cities - low-density, low-rise cities - later appeared in monsoon Asia and the American continents. In the pre-modern period, redesigned walled cities - type 4 - became the ideal in Europe, and spread throughout the world. From 1800, as cities discontinued the use of surrounding walls, urban populations and municipal areas grew. And finally, densely populated megacities - type 5 - emerged in the 20th century, as urban areas continued to grow and incorporate local architectural traditions.

Using population density data from the US Department of Energy's LandScan project, our team defined 18 distinct regions as "megacities". However, the resilience and sustainability of a city are not merely a function of its structure and climate. They also depend on a number of social factors tied to ideologies, customs, and religions. The megacities that emerged in the 20th century have not yet demonstrated the resilience to endure. And now, in the early 21st century, local conditions must also be considered. When new types of cities have emerged or been introduced in a region, they have been accompanied by social changes and revolutionary technologies. Examples include the Iron Age of around 1000 BCE, the changing religious ideas around 300 CE, an agricultural revolution in the Middle East around 1000, the discovery of the New World in 1492, and the Industrial Revolution around 1800. Now, at the dawn of the 21st century, the age of megacities has just begun. Since World War II, we have witnessed the information revolution, globalization, battles for natural resources, climate change, ethnic and religious conflicts, and terrorism by Islamic fundamentalists. How are these enabled and enhanced by the existence of megacities?

The Rise and Fall of Cities in Prehistory: An Example From the Indus Civilization

Steven WEBER

Washington State University Vancouver, USA

Steven WEBER is an associate professor in the department of anthropology at Washington State University Vancouver. He received his Ph.D. in archaeology at the University of Pennsylvania (1989). His research focuses on how and why people use plants and how changes in agricultural strategies relate to shifts in cultural practices. Some of his major publications include “Does Size Matter: The Role and Significance of Cereal Grains in the Indus Civilization” (2010, Archaeological and Anthropological Sciences), “Ecological Continuity: An Explanation for Agricultural Diversity in the Indus Civilization and Beyond” (2010, Man and Environment), “Rice or Millets: Early Farming Strategies in Central Thailand” (2010, Archaeological and Anthropological Sciences), “Indus Ethnobiology” (2013, Lexington Books), “Plants and Harappan Subsistence” (1991, Westview Press), “Out of Africa: The Initial Impact of Millets in South Asia” (1998, Current Anthropology), and “Seeds of Urbanism: Palaeoethnobotany and the Indus Civilization” (1999, Antiquity). *webersa@vancouver.wsu.edu*

Abstract

Some of the largest megacities in the world are today located in South Asia. Understanding their development and sustainability can be strengthened through an historical perspective. The first cities of South Asia dealt with many of the same concerns, problems, and environmental issues facing contemporary cities. These early cities, all associated with the Indus civilization, were initially settled in the third or fourth millennium B.C. How they were organized, grew, interacted with other communities, adapted to the local environment and dealt with climate change can give great insight into understanding South Asian cities of today. This paper will take an archaeological approach to the rise and decline of cities by focusing on the Indus civilization. It will examine how cities like Harappa and Mohenjo-daro grew into being some of the largest cities of their time, yet ultimately declined as they were not sustainable in a changing environment.

Teotihuacan: Origin, Urban Impacts, and Legacy of an Ancient City

SUGIYAMA Saburo^{1 2}

1. Aichi Prefectural University, Japan

2. Arizona State University, USA

SUGIYAMA Saburo born in 1952 in Japan, is currently a professor of the Graduate School of International Cultural Studies at Aichi Prefectural University in Japan, and a research professor of the School of Human Evolution and Social Change at Arizona State University, USA. He obtained his Ph.D. in 1995 from Arizona State University. His major research interests include Mesoamerican archaeology, ancient architecture, urbanism and symbolism, and theories of cognitive archaeology. He was engaged in numerous archaeological research projects in Mexico, Guatemala, and Japan, particularly at Teotihuacan, Mexico. He carried out intensive excavations at the Moon Pyramid as co-director of that project, at the Feathered Serpent Pyramid, and recently at the Sun Pyramid in Teotihuacan as project associate director. He was awarded *Commendation from the Minister of Foreign Affairs, Japan* for his academic achievements in Mexican Archaeology and related international social activities in 2012. His recent publications include “Human Sacrifice, Militarism, and Rulership: Materialization of State Ideology at the Feathered Serpent Pyramid, Teotihuacan” (2005, Cambridge University Press), “The Moon Pyramid Project and the Teotihuacan State Polity” (2010, *Ancient Mesoamerica*), and “Teotihuacan City Layout as a Cosmogram” (2010, Cambridge University Press). *3sugiyama@gmail.com*

Abstract

The ancient planned city of Teotihuacan emerged rather suddenly in the Mexican central highlands in the 1st century AD. The city developed as the largest in the New World by that time with estimated population around 100,000 covering about 25 km². I first describe regional contexts in which this urban center was formed, transformed, and collapsed. I introduce actor-centered theories including certain principles from cognitive sciences and, based on outcomes from the latest excavations, present our current perspectives about the origin, monumentality, state ideology, political structure, impacts on the natural and social environments, and multi-ethnicity of the urban population. Then, I briefly summarize the issues of the collapse of the Teotihuacan state and what happened after the collapse in terms of subsistence, changing socio-political systems, and human-nature interactions. Finally, I discuss the nature of urbanism in pre-industrial cities in Mesoamerica, re-evaluating possible factors underlying the urbanism and what we can learn from the past societies.

We still don't know how and why the city of Teotihuacan was created at that particular spot as related data were still scant. However, recent archaeological researches indicate that Teotihuacan developed fundamentally as an attractive ceremonial center from an early stage and quickly became a multi-functional prosperous metropolis. Intensive excavations carried out at the three major monuments, the Sun Pyramid, the Moon Pyramid, and the Feathered Serpent Pyramid, revealed that ancient leading groups were concerned with worldview and astronomical movements that controlled the changing nature, cycles of agriculture, and human life, and that specific ideological factors related to this unique worldview was explicitly materialized at the Teotihuacan monuments in an unprecedented scale. Particularly movements of the Sun, the Moon, and the Venus, complicated calendar cycles, and their dualistic view of the nature, like dry-rainy seasons, were symbolically integrated in architecture, urban orientation, spatial patterns, sculptural programs, and mass-human sacrificial burials we uncovered. This kind of mortuary rituals created with innovative ideas and advanced technologies was among attractive factors which brought people and materials from distant regions of Mesoamerica to Teotihuacan. Archeological evidence from residences clearly indicates that people moved in after early monuments were constructed. As the city fast developed as a pilgrimage center, different kinds of activities by diversified and specialized people became active, extensive, and more complex. For example, special type ceramic productions or obsidian industries were consequences rather than causes of the urbanization.

The ancient state was collapsed sometime in the 6th century probably as the outcome of social conflicts rather than natural disaster or over-exploitation of natural resources. The ruined monuments and objects from the ancient city, and other cultural features became legacy of ancestral worship and symbols of rulership during the following generations. The arrival of Spaniards drastically changed natives' worldview and real world also, by introducing European cultures, like Spanish kingship, Christianity, the World Economy system, and domesticated animals and plants that fundamentally shifted the ecological niches. However, we can still observe surviving features, like natural/social diversities and intellectual capacities that once created collaborative multi-ethnic urban life at Teotihuacan.

Landscape Ecological Urbanism in Southeast Asia: A Strategy to Create New Urban Territories that Reflect Cultural and Natural Processes

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Abstract

Landscape ecological urbanism aims to combine the theory and practice of city design and planning, as a means of adaptation, with the perspectives of ecology – the study of the relationships between living organisms and their environment and the processes that shape both – and other environmental disciplines, such as climatology, hydrology, geography, psychology, history, and art. In this study, a future strategy in the context of landscape ecological urbanism in Southeast Asian region was discussed through analysis of the features of urbanization in Jabodetabek area, Indonesia, and evaluation of its impact on the environment through field survey and numerical simulation. The analysis was implemented paying attention to ecological condition and indigenous life styles.

Four study sites; Tangerang, Kampong Bali, Cikini and Dakota were selected for the analysis. One in were selected. The site in Tangerang was chosen to analyze the rapid land use change in peri-urban area. The sites in Kampong Bali and in Cikini were chosen to analyze the feature of living environments in congested residential area in central urban districts. The mid-rise building in Dakota was also chosen to discuss the residents' life styles and built environment.

Firstly, land use change was analyzed by using aerial photos and satellite images during the last 25 years. Secondly, information on building shapes and materials, and in which year each house had been built, was collected in the study area. Thirdly, the 3D-CAD model, to which the material and physical property data were added, was developed, and the surface temperature distribution was calculated through numerical simulations. Further, two indices were used to evaluate the impact on the thermal environment: Heat Island Potential (HIP) was an index of the sensible heat flow rate on all surfaces in the area, and Mean Radiant Temperature (MRT) was one of the indices for the evaluation of thermal comfort. Then the residents' life styles and their behavior were observed and its results were compared to the results of numerical simulations and others.

Through the analysis, the following findings were obtained. In all study sites, it was observed that the residents come out and stayed in outdoor open spaces frequently. Through the simulation analysis of thermal environment, it was revealed that the residents selected the place to stay where MRT scored very low value (comfort area). Comparative analysis on the air temperatures between indoor and outdoor revealed that the air temperature of outdoor scored low enough for human comfort during the time they used air-condition. This feature was observed in all of four study sites in common. This indicates that the residents whose house installed air conditioner pay less attention to the surrounding environment. Besides, the result of questionnaire survey indicated that the people who stay longer in outdoor spaces feel stronger belongingness to the community than the people who stay little in outdoor space. Based on these findings, a future strategy to create new urban territories that reflect cultural and natural processes was proposed illustrating the study site in Tangerang.

Human Utility of Marine Ecosystem Services and Behavioral Intentions for Marine Conservation: Implications for Urban-Suburban Partnership

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Abstract

Consumer behaviors in megacities have an impact on suburban areas. The purpose of this study is to identify food preferences of city consumers and to discuss the implications for urban-suburban partnership towards the conservation and sustainable use of ecosystem services. Particular focus has been placed on seafood products in this study. Fish and fishery products constitute a valuable source of protein in many countries. According to the FAO, in 2009, fish accounted for 16.6 per cent of the global population's intake of animal protein, with the most substantial increases in annual per capita fish consumption occurring in East Asia.

People's seafood consumption patterns do not always correspond to the natural conditions of the ocean resources. Consumers tend to have stronger preferences for consuming fish that occupy higher trophic levels in the ocean ecosystem. For instance, tuna is one of the ocean's top predators and the carrying capacity of tuna in the ocean ecosystems is smaller than for other fish species (such as sardine species) that occupy lower trophic levels. The results of an online survey, conducted in March 2014 and collected responses from 3,332 residents in Japan, indicate that 75% prefer tuna, while 52% prefer sardine.

Another online survey on perceptions of marine ecosystem services was conducted in February 2013 and collected responses from 814 residents in Japan. Wakita et al. analyzed the data using a structural equation model based on the collected responses, and found that in terms of marine ecosystem services, there were three categories of perceptions among residents of both coastal and inland areas, namely "Essential Benefits" (roughly corresponding to the supporting and provisioning services described in the Millennium Ecosystem Assessment), "Indirect Benefits" (roughly corresponding to the regulating and provisioning services described in the MA), and "Cultural Benefits" (corresponding to the cultural services described in the MA). Among these three categories, "Cultural Benefits" were found to have the greatest influence on behavioral intentions for marine conservation, followed by "Essential Benefits" such as food provisioning.

These results suggest that, in order to increase support for marine conservation from residents in Japan and thus to achieve stronger urban-suburban partnership, measures aimed at enhancing cultural benefits of ecosystem services would be the most effective. To mitigate the impacts of consumer behaviors on suburban or rural ecosystems, a policy option can be suggested that allows city residents to enjoy cultural benefits such as the recreational values provided by suburban areas.

Hometown Investment Trust Funds: New Financing Methods to Link Urban Centers and the Regions, and their Possibilities

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Abstract

Hometown investment trust fund (HIT, small investments aimed at regional development) is a new financial intermediary channel outside the indirect financing (bank lending) and capital market sectors of Japan's financial system. Japan's domestic financial system has excessive reliance on bank lending market, which has short term nature due to its funding source (i.e. deposit) and has rapidly transitioned from a multi-layered to a single-layered form over the past 20 years, its functional limit has been pointed out as one of challenges for wide range of economic / social activities. Those include efforts for recovering or revitalizing regional economy, promoting environmental projects, creating new business by young entrepreneurs as well as rebuilding city structure and old infrastructures throughout the country, all of which are essential parts of sustainable economy and require long term financing as well as stable supply of risk capital.

HIT create a flow of funds with a new risk return profile – a flow that cannot be provided by the traditional indirect financing system alone – for those projects. It also helps to strengthen the functions of finance as a system supporting the overall real economy.

However, HIT is not only providing financing with new risk return profile to those individual projects, but also creates direct linkage and encourages interactive relationship between individual households and each investee through formal investment contracts (silent partnership contract) for certain long period of time. As those individual households (investors) are living mainly in large cities such as Tokyo, Osaka or Sendai, it could be said that HIT contributes to bring strong money flow from large cities to many projects in regional area, which often have strong sensitivity to local environment or even coexist with surrounding natural environment. In that context, the money flow through HIT has an important function to foster strong local stakeholders in regional environmental issues.

This paper reviews the historical background and key initiatives leads to emergence of Hometown Investment Trust Funds, and then describes the current status of HIT, including government initiatives as a part of national economic recovery plan under "Abenomics". Finally, several selected case studies of HIT will be presented and their implications to environmental issues as well as opportunities to rebuild Urban-Suburb Partnership will be discussed.

The Sanitary to Sustainable to Sacred City: Urban Nature Experience and Engagement

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Abstract

Best practices and infrastructure systems of a sanitary city provide the most basic conditions necessary for good health for all city residents, such as clean air and water, and the absence of toxins. Environmental protection agencies at national and regional levels may monitor and regulate potential harmful impacts from pollutant emissions, harmful materials dumping, and industrial and agricultural by-products. Some megacities struggle to meet basic daily needs such as safe housing, dependable utilities and transportation; many others have achieved dependable and affordable basic systems and services. The degree to which a city has achieved the sanitary city status has enormous consequences for the health and quality of life of its residents.

Urban sustainability initiatives are opportunities to initiate a greater degree of ecological function within both established and new infrastructure systems. Urban forestry and green infrastructure are increasingly utilized as prevention or mitigation strategies within both regulatory and voluntary programs of urban sustainability. Of interest to both governments and citizens, once basic systems are in place, is the livability of urban areas and the quality of life afforded its citizens. Residents of highly urbanized centers often expect livable environments that include access to urban nature and investments in green infrastructure.

While environmental services such as air and water purification, stormwater management, reduced heat island effect and other biophysical functions are increasingly recognized in the sustainable city, the expanding presence of nearby nature in cities also offers social and psychological benefits. Green infrastructure can be more effectively planned and designed to generate co-benefits of improved human physiology, wellness, mental function, and work or school performance. Nearly 40 years of research demonstrates that passive experiences of nature in cities contribute to economic and social vitality of communities.

Engagement in the sustainable city is necessary as involvement of citizens in stewardship converts the objective presence of green infrastructure from a public service to a personal responsibility. Organized action for lands management, ecological restoration, and biodiversity reconnects people with their regional landscapes, and enables them to participate in the successes of sustainability. Civic environmental stewardship becomes a force of governance as organizational participation in the long term processes of sustainability builds deeper connections across ecology, economy, and community.

In mega-cities the urgency of meeting basic and perceived daily needs can disable the distinctly important connections to the natural systems that sustain us. The sacred city is one in which environmental wellness, ecological function, and stewardship engagement become an explicit and appreciated element within the lives of people. While nature serves important functions and services it also offers opportunity for sacred respite, contemplation, and the resilience to imagine conditions that enable people in megacities to achieve greater satisfaction and happiness.

In the transitional conditions of the sanitary to the sustainable to the sacred city, people are simultaneously nurtured by natural systems and are deliberately involved in a reconnection to the fundamental processes of living systems. What are the physical expressions of these situations; examples of planning and design will be presented.

Visualization of City Sustainability Index (CSI): What is City Sustainability? How Can we Assess City Sustainability?

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Abstract

The purposes of this paper are: (i) to provide the definition of city sustainability with the concepts of sustainability and cities discussed; (ii) to develop a methodological framework for assessing city sustainability; and (iii) to create a visualized model of the City Sustainability Index (CSI) as a prototype. We define a sustainable city as the city that maximizes the total net benefits enjoyed by residential people with relevant constraint conditions of environmental negative impacts and socio-economic equity kept. The benefits of agglomeration effect and the constraint conditions are provided by individual indicators of CSI. Based on the definition of city sustainability, we should note three key notions in the methods of city sustainability assessment. First, environmental limitations of cities should be evaluated, including leakage effects globally. Cities are not independently sustainable in that they rely on other areas such as natural and semi-natural land, hinterland, agricultural land and other cities beyond their boundaries for the supply of resources and food, the disposition of wastes, the emission of pollutants, the indirect use of ecosystem services, and so on. Thus, the dependency of cities on other areas – leakage effects of cities on other areas – should be considered for assessing city sustainability. Otherwise, all the cities would be always judged non-sustainable. Second, all the constraint conditions in terms of environmental negative impacts and social/economic distributional equity should be satisfied for sustainability respectively. This is a minimum requirement for sustainability. If such conditions are broken even in one aspect in a city, a city should be treated as a non-sustainable city. Third, the binding constraints are not sufficiency conditions for sustainability. Cities must play a crucial role in creating the benefits of agglomeration effect. Even if cities are healthy in terms of environmental limitations and socio-economic equity, we do not highly evaluate the cities in which people are very poor and living conditions are disgusting in the social and economic dimensions.

We create a visualized 3-D model of CSI in order to clearly show the results of city sustainability assessment in each city. The results should not be too complicated to be easily understood. This is because the results should be useful for urban policies towards sustainable cities. We need to contrive a new system of visualizing the results of the assessment so that even laypeople can easily and quickly understand the results. In this regard, the visualized model satisfies the following three necessary conditions. First, it should clearly show whether a target city keeps individual constraint conditions respectively. Second, the size of benefits should be able to be compared between cities at first glance. Third, it should be visually understandable whether the performances of a target city are balanced among environmental, economic, and social indicators. Additionally, it is desirable that several characteristics of each city should be visually shown in the model: population density, population distribution, the shape of the city and so on.

An Analysis of the Use of Urban Sustainability Indicators: Lessons from Cities of Quebec

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Abstract

In this paper, we address the interpretation of urban sustainability indicators following their measurement. The typical approach in measuring sustainability appoints the best performing cities on the basis of their indicators value. We argue that this approach is relatively limited and raise two main issues. On the one hand, it underestimates the possible compensation between socioeconomic and environmental-related indicators. On the other hand, it overlooks the progress achieved by the cities, which is a central feature of sustainability. Based on these observations, we propose that the best performing cities with respect to sustainability are those that meet the following three performance criteria. First, they display a relatively higher score based on the indicators measurement. Second, their environmental performance and socioeconomic performance are high and non-compensatory. Third, they must improve over time. Additionally, we illustrate the relevance of these criteria using a comparative analysis of the performance of 25 Quebec cities in terms of sustainability in 2006 and 2011.

Sustainability and the Urban Functions from the Perspective of the Global Power City Index

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Abstract

What does a comparative analysis of global cities contribute to the discussion of urban sustainability? The Global Power City Index (GPCI), issued annually by the Mori Memorial Foundation's Institute for Urban Strategies, studies and ranks the “comprehensive power” of the 40 major cities of the world. Based on the collection of a wide range of statistical materials and original surveys, the cities are evaluated in terms of 70 indicators, which are grouped into six urban “functions,” i.e. Economy, Research and Development, Cultural Interaction, Livability, Environment, and Accessibility. The indexed scores in each function represent the city's relative strengths and weaknesses in comparison with the other cities. Although the indicators for Environment are mostly based on the existent statistics, the Index may offer an insight for a comparative understanding of the urban sustainability.

The GPCI uses three “indicator groups” in evaluating the environmental aspect of the cities. “Ecology” focuses on the city's efforts on sustainability in both public and private sectors. Three indicators, the Number of Companies with ISO 14001 Certification, the Percentage of Renewable Energy Used, and the Percentage of Paper Recycled, constitute this group. “Pollution” mainly focuses on the degree of the air pollution of the city. The indicators of CO₂ Emissions, the Density of Suspended Particulate Matter (SPM), and the Density of Sulfur Dioxide (SO₂) and of Nitrogen Dioxide (NO₂) are used for this group. “Natural Environment” focuses on the other aspects of the environment. The Water Quality, the Level of Green Coverage, and the Comfort Level of Temperature are the indicators that form this group.

Although the GPCI aims to evaluate the total performance of the cities, the multilevel indexes may be useful for understanding the global patterns of sustainability. For example, it is clearly observed in GPCI's scores that the established megacities such New York, Paris, and Tokyo have either stabilized or reduced its CO₂ Emissions in the recent years, while the fast-growing Asian cities such as Singapore, Shanghai, and Beijing are showing a steady increase in the emissions. Patterns within a single city are also reflected in the ranking. For instance, Tokyo is ranked number one in the ranking for Environment in general, but is number 33 in Percentage of Renewable Energy Used. The Index offers a tool to grasp the complex effects of the global urban competitions on sustainability. Drawing on the Index's methodology, comprehensive ranking, and environmental rankings, this presentation discusses the specific structure of the GPCI and its implications for the evaluation of the urban sustainability.

Essence of City Prosperity Index: A Measuring Tool a Policy Dialogue

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Abstract

In 2012, UN-Habitat put forward to the world a fresh approach to urban prosperity, one that is holistic and integrated and which is essential for the promotion of collective well-being and fulfilment of all. This new approach helps cities to steer the world towards economically, socially, politically and environmentally prosperous urban futures.

The City Prosperity Index is a strategic measurement, monitoring, and policy tool for cities that are committed to adopt a more holistic, people-centred, and sustainable notion of prosperity and that pledge to deploy the necessary efforts and resources to move forward on the prosperity path. The City Prosperity Index (CPI) is meant to assist decision makers to design clear policy interventions. The CPI does not only provide indices and measurements; it also enables city authorities and local stakeholders to identify opportunities and potential areas of intervention for their cities to become more prosperous. It includes various indices and indicators that are relevant to cities, and important for prosperity-oriented public policy-making.

The CPI estimates prosperity by the following six dimensions: Productivity, Infrastructure Development, Quality of Life, Equity and Social Inclusive Cities, Environmental Sustainability, Governance and Legislation. Each of the dimensions of prosperity is constituted by a series of sub-indices, which in turn make up a set of indicators that allow the calculation of the specific index for each dimension. The aggregation of these six sub-indices generated consolidated CPI, either in its basic version, expanded or contextual.

The Cities Prosperity Index has a double function: as a measuring tool and platform for global comparability in which cities can assess their situation comparing their rate with other cities around the world, and as a policy dialogue tool where the data and information conforming the index are used to detect the progress in the dimensions of prosperity and to understand significant deficiencies are recorded. For this reason, the CPI is constructed incrementally: favouring, at a basic level the regional or global comparison and at an extended level providing the ability to integrate contextual aspects of cities, including their comparative advantages as well as elements of policies and actions which the CPI is intended to assess. Thus, the CPI is measured according to three scenarios: the Basic Extended and Contextualized Index.

Currently the approach has been implemented in almost 200 cities around the world: 145 cities in Mexico, 23 in Colombia, 5 in various Latin American countries, 10 cities in Ethiopia, 10 in Egypt the participant cities showing commitment to improve prosperity to possible financial sources, in order to access selected and strategic investments from domestic and international markets, as well as opportunities for creative partnerships.

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