EKISTICS
ΟΙΚΙΣΤΙΚΗ

VOL. 69, NO. 415/416/417, JULY./AUG.-SEPT./OCT.-NOV./DEC. 2002

the problems and science of
HUMAN SETTLEMENTS

TRIPLE ISSUE

WSE
2001 MEETINGS
BERLIN
OCTOBER 24 to 28

Defining Success of the City in the 21st Century — 2 of 2

EKISTICS: the problems and science of HUMAN SETTLEMENTS

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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.

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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

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Volume 69, Number 412/413/414, January/February-March/April-May/June 2002

Defining Success of the City in the 21st Century – 1 of 2

The 2001 WSE Meetings, Berlin, 24-28 October

I. Executive Council Meeting

II. The C.A. Doxiadis Lecture

III. Symposion: Defining Success of the City in the 21st Century

Part 1: Introduction

Part 2: Nature

Part 3: Anthropos

Part 4: Society

The papers in this issue are selected from documents presented – or made available to participants – at the conference "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001, which took place on the premises of the Wissenschaftszentrum Berlin (Science Center Berlin) at the invitation of Professor Udo E. Simonis, President of the World Society for Ekistics. In most cases papers were edited by P. Psomopoulos following consultation with the authors whenever possible and in collaboration with R.J. Rooke, Assistant Editor. Alex Freme-Skliros proofread the texts and Niki Choleva was responsible for typesetting and graphics.

EKISTICS / ΟΙΚΙΣΤΙΚΗ: the problems and science of HUMAN SETTLEMENTS
Volume 69, Number 415/416/417, July/August-September/October-November/December 2002

Defining Success of the City in the 21st Century – 2 of 2

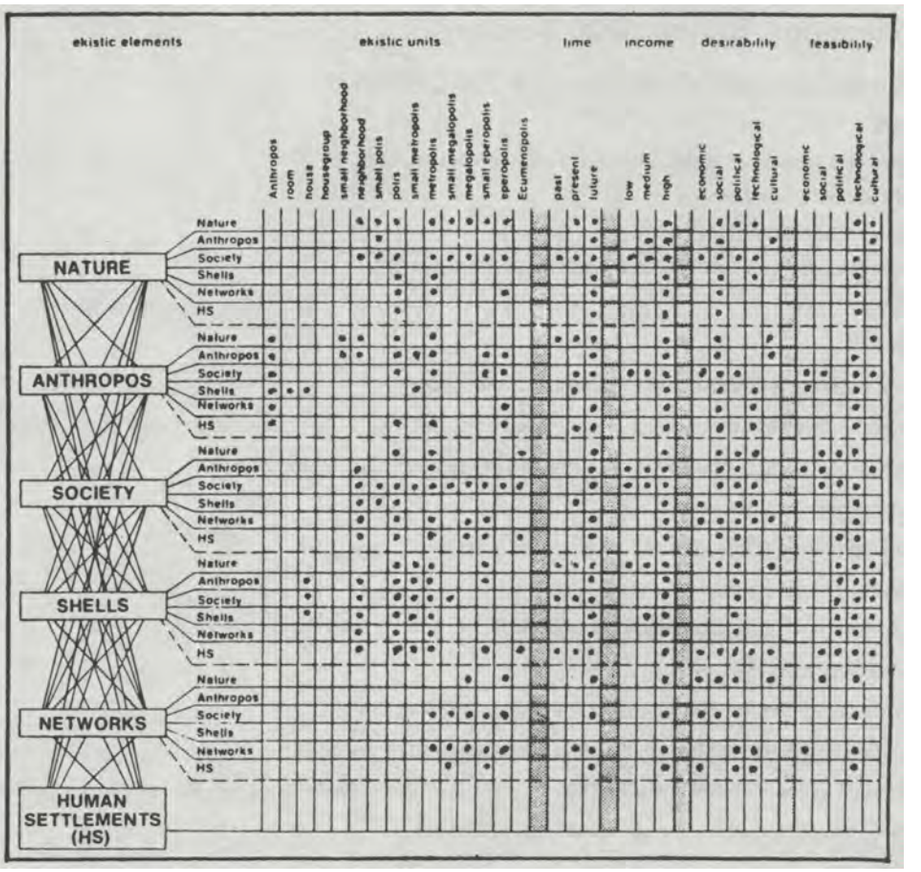
The 2001 WSE Meetings, Berlin, 24-28 October

III. Symposion: Defining Success of the City in the 21st Century (cont'd)

IV. General Assembly

The papers in this issue are selected from documents presented – or made available to participants – at the conference "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001, which took place on the premises of the Wissenschaftszentrum Berlin (Science Center Berlin) at the invitation of Professor Udo E. Simonis, President of the World Society for Ekistics. In most cases papers were edited by P. Psomopoulos following consultation with the authors whenever possible and in collaboration with R.J. Rooke, Assistant Editor. Alex Freme-Skliros proofread the texts and Niki Choleva was responsible for typesetting and graphics.

The anthropocosmos model



Adapted version of model for EKISTICS

Usually the Anthropocosmos Model reflects the contents of the issue to which it belongs. This time, however, it reflects two issues (vol. 69, no. 412/413/414, January/February-March/April-May/June 2002 and vol. 69, no. 415/416/417, July/August-September/October-November/December 2002) which are devoted to papers presented and other material used from the 2001 programs of the WSE – more specifically the 2001 C.A. Doxiadis Lecture and the Symposion on "Defining Success of the City in the 21st Century".

The editor's page

As a documentation and communication vehicle – part of a broader effort of the Athens Center of Ekistics (ACE) to contribute to the development of a sound approach to the field of Human Settlements – Ekistics makes itself available as a free forum for the exposure of ideas and experiences from anywhere to everywhere, provided they are relevant and transferable.

In this effort, writings of members of the World Society for Ekistics (WSE) have quite frequently been considered and published in Ekistics.

How could our attitude be different in cases of collective efforts of the WSE such as its meetings last year in Berlin (24-28 October, 2001) with the title "Defining Success of the City in the 21st Century"? Actually, we have reported on such events on various occasions in the past, the most recent being in vol. 64, no. 385/386/387, July/August-Sept./Oct.-Nov./Dec. 1997 and vol. 65, no. 388/389/390, Jan./Feb.-Mar./Apr.-May/June 1998 on "Mega-Cities ... and Mega-City Regions", a conference of which the WSE was a co-sponsor together with Tsinghua University, Beijing, China, and the University of British Columbia, Canada.

We are happy that the World Society for Ekistics welcomed our proposal to consider the large number of documents made available at its meetings in Berlin and select some of the papers presented for publication in Ekistics. However, the amount of material available far exceeded the capacity even of one triple issue. Hence the following two triple issues:

1. Defining Success of the City in the 21st Century – 1 of 2 (Ekistics, vol. 69, no. 412/413/414, January/February-March/April-May/June 2002); and,
2. Defining Success of the City in the 21st Century – 2 of 2 (Ekistics, vol. 69, no. 415/416/417, July/August-September/October-November/December 2002).

The meetings consisted of

I. The WSE Executive Council
II. The annual C.A. Doxiadis Lecture
III. A Symposion "Defining Success of the City in the 21st Century" and
IV. The General Assembly of WSE members

Deviating from the usual way of selecting papers from such conferences and organizing the material along the views of the Editor, this time, as an exception and in order to give a more complete image of the event, we thought it advisable to include the entire program and provide whatever information was considered relevant from all four distinct meetings. As one would expect, emphasis is given to the C.A. Doxiadis Lecture and the Symposion. Again in this case we thought of following the allocation by theme and sub-theme of the material according to the detailed program of the Symposion, in nine sections. All this is explained in the following page and the tables of contents which precede this note.

Here for the sake of clarity, please note that the present issue – the second of two – begins with Part 5 of the Symposion and contains 26 papers corresponding to the last five of the nine parts of the Symposion. The first issue contains 20 papers, i.e. the 2001 C.A. Doxiadis Lecture and 19 papers from the first four of the nine parts of the Symposion.

I close this note by thanking:

- the WSE for having entrusted us with undertaking the effort of presenting this material;
- all the contributors, most of whom willingly – or by force due to the pressure exerted by the Editor – devoted additional work to their papers for the sake of readers;
- Mrs Noriko Doi for having provided most of the photographic material and Ross Holland from whose report "2001 Berlin Symposion of the World Society for Ekistics" we borrowed four photographs without even asking for his permission as we were sure he would grant it;
- Mrs Alex Freme-Skliros (and here I am joined by R.J. Rooke) whose devotion and hard work surpassed all description in making the present task feasible.

P. Psomopoulos

The 2001 Meetings of the World Society for Ekistics

The contents of the present issue come as a continuation of the previous issue of Ekistics, vol. 69, no. 412/413/414, January/February-March/April-May/June 2002, with the same theme. As is explained in the table of contents (pages 2 and 3) of that issue and also reproduced in the table of contents (pages 178 and 179) of the present issue, the material used is classified as follows:

The 2001 Meetings of the World Society for Ekistics, Berlin, 24-28 October

I. Executive Council Meeting
II. The C.A. Doxiadis Lecture
III. Symposion: Defining Success of the City in the 21st Century
IV. General Assembly

Apart from the C.A. Doxiadis Lecture, the main contents of both issues refer to the material collected before, during and, in some cases, after the Symposion "Defining Success of the City in the 21st Century". More specifically, the issues contain:

a) Papers reflecting the presentations made during the Symposion and these concern papers delivered before and during the Symposion or documents that were prepared by the presenters after the Symposion.
b) Papers that were made available at the Symposion by members who intended to attend but finally were totally unable to do so. These documents were made available to all participants but were never presented or discussed. Some were revised and edited by the authors.
c) Papers that were prepared after the Symposion by members who could not attend.

Documents of all three categories above are classified and presented by main theme and sub-theme and in the sequence defined by the Daily Program (p. 19) that the reader is requested to consult.

Furthermore for each one of the nine sessions, the program provided for a Chairman, presentations, discussion, and a statement relating the presentations to the ekistics framework. However, no record was kept either of the statements by the Chairmen or by the discussants and the presenters of the ekistics framework.

For purposes of clarity and other practical reasons, the documents were classified into Parts 1 to 9 corresponding to the themes and sub-themes in the Daily Program as follows:

Part 1: Introduction
Part 2: Nature
Part 3: Anthropos
Part 4: Society
Part 5: Shells
Part 6: Networks
Part 7: Education and Research
Part 8: Synthesis
Part 9: Conclusions

In the indication of the structure and number of participants involved in each part, those who were not present in Berlin are considered as contributors.

The previous issue ends with Part 4, and the present issue, vol. 69, no. 415/416/417, July/August-September/October-November/December 2002, begins with Part 5 of the Symposion and ends with the closing of the 2001 meetings of the World Society for Ekistics. The reader can follow this in detail in the tables of contents of both issues preceding this note on pages 178 and 179.

Symposion: Defining Success of the City in the 21st Century

Part 5: Shells

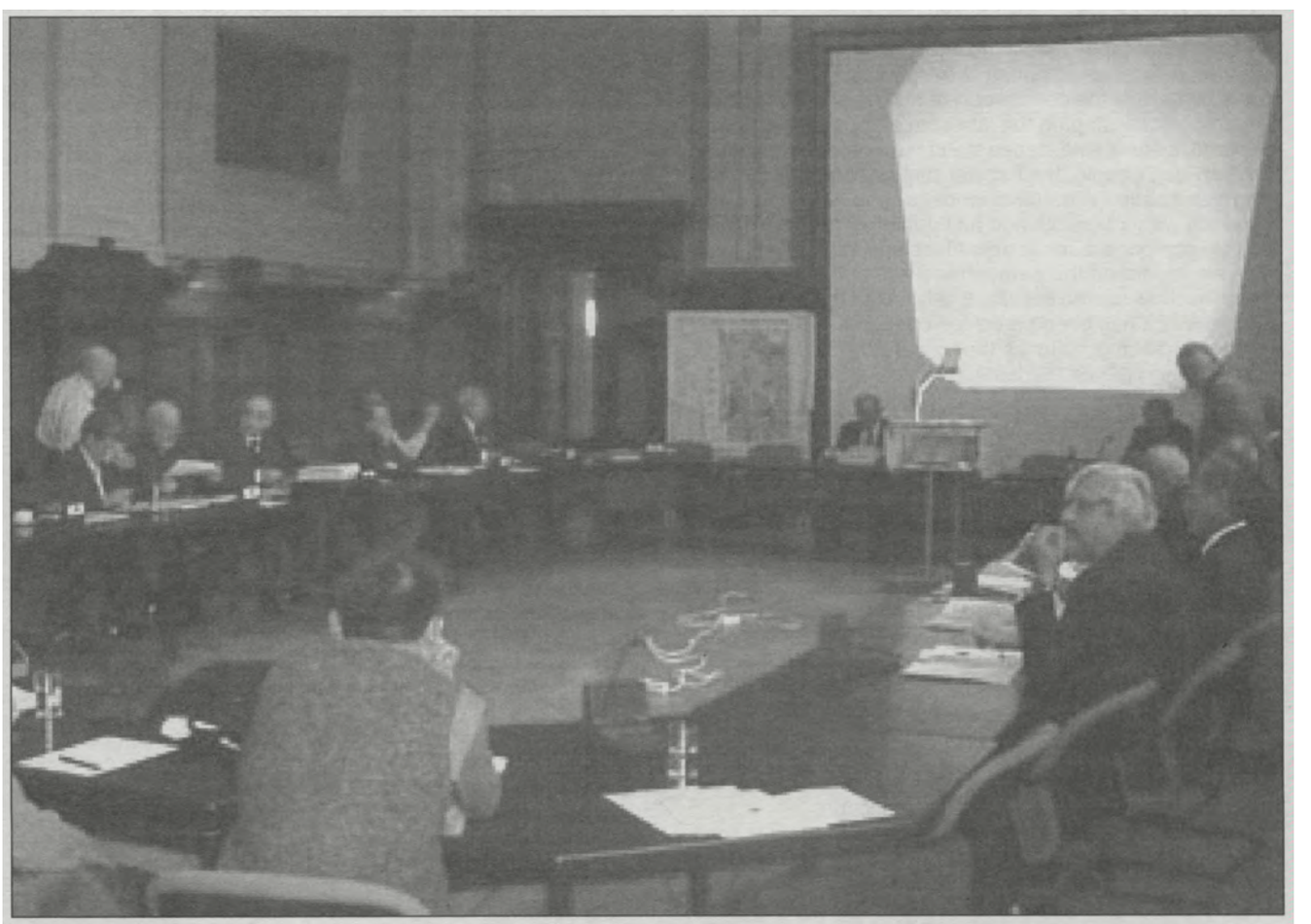
Chairman : **Lawrence D. Mann***

Presentations : **Barry Rae, Takashi Doi, Alvaro Uribe**

Contributions : **Rita Colantonio Venturelli, Alexander Papageorgiou-Venetas**

Discussion* : **Ray Bromley, Aldo Cuzzer, Haruhiko Goto, Ian Munro, Wu Weijia**

***No written record exists of any statement made during the sessions.**



Areas of cultural and ecological re-equilibrium in human settlements

Rita Colantonio Venturelli

Dr Colantonio Venturelli is a research fellow at Ancona University where she teaches territorial and town planning based on the principles of landscape ecology and urban ecology. Her research has always been carried out not only in Italy but also in other European countries (Switzerland, Germany). She is a member of several scientific associations including the World Society for Ekistics (WSE). The text that follows is an edited and revised version of a paper made available by the author to participants at the WSE Symposion "Defining Success of the City in the 21st century," Berlin, 24-28 October, 2001, which she was finally unable to attend.

Introduction

"Cultural landscapes reflect the interactions between people and their natural environment over space and time. Nature, in this context, is the counterpart of human society: both are dynamic forces shaping the landscape. In some regions of the world, cultural landscapes stand out as models of interaction between people, their social system, and the way they organize space. A cultural landscape is a complex phenomenon with a tangible and an intangible identity. The intangible component arises from ideas and interactions which have an impact on the perceptions and shaping of a landscape, such as sacred beliefs closely linked to the landscape and the way it has been perceived over time. Cultural landscapes mirror the cultures that created them." (DROSTE, PLACHTER and RÖSSLER, 1995).

Area of re-equilibrium – The concept

Modern Western thought that has arisen from the Industrial Revolution has tended to see the concepts of nature and culture as distant from each other and, as technological progress advanced, even opposite to each other. Instead of being viewed as complementary, some disciplines – land planning among them – have for a long time been conditioned by such an attitude. This has contributed to shaping a strongly unbalanced cultural landscape, where all the functions connected with technological culture have come to be concentrated in the large urban settlements, resulting in the neglect and eventual loss of the fundamental relationship with the historical culture of the sites, with their physiographic characteristics and their natural heritage. This is a fundamentally wrong attitude because all these elements constitute a unitary and intimately connected system – the total landscape.

Over the last decades, after the waning of excessive confidence in technology and economic expectations, new forms of management of the cultural landscape have actively been sought. UNESCO's action for the protection of cultural landscapes of universal value is one such initiative. However, action should also be undertaken to manage landscapes that do not have universal value, because these too have the potential to rebalance, so to speak, the areas where the dense concentration of functions associated with technological culture has replaced all the other components of the total landscape.

The need for integrated management of land and the environment

There are cases where cultural landscapes are not allowed to exert this action of re-equilibrium, frequently because of mismanagement of land and the environment. These activities are often planned on an excessively small spatial scale and on an excessively close temporal scale. By contrast, amending errors of this kind would allow the achievement of the three main targets that are essential for the fulfilment of the local potential:

- the protection of the cultural as well as the natural identity of an area;
- the development of the model of potential growth suggested by the local cultural and natural features; and,
- the linkage of this integrated cultural and natural model to its wider spatial context.

The need for setting up observatories of the transformations of the cultural landscape

Integrated planning of the cultural landscape seen in all its facets cannot be successful unless the evolution of its essential features is continuously monitored (fig. 1). To do this, it would be helpful to select some observation points from where to monitor both the ongoing and the potential transformations with a view to identifying evolutionary models that can be useful not only locally but also in other similar sites. Indeed, several sites could be connected into networks of similar cases. In addition, these observatories could provide the administrative bodies responsible for the planning and management of land and the environment with the data on the state of the landscape indices that would allow the monitoring of these areas as well as the prediction of future transformations.

A case illustrated in this paper represents a significant example of the scope for managing in this way a border region between Italy and Switzerland – Insubria, in Lombardy. This region has a rich cultural and historical heritage and considerable natural resources, and could contribute – if properly managed – to rebalance the landscape of an area of Lombardy that has undergone a most marked anthropic transformation (fig. 2).

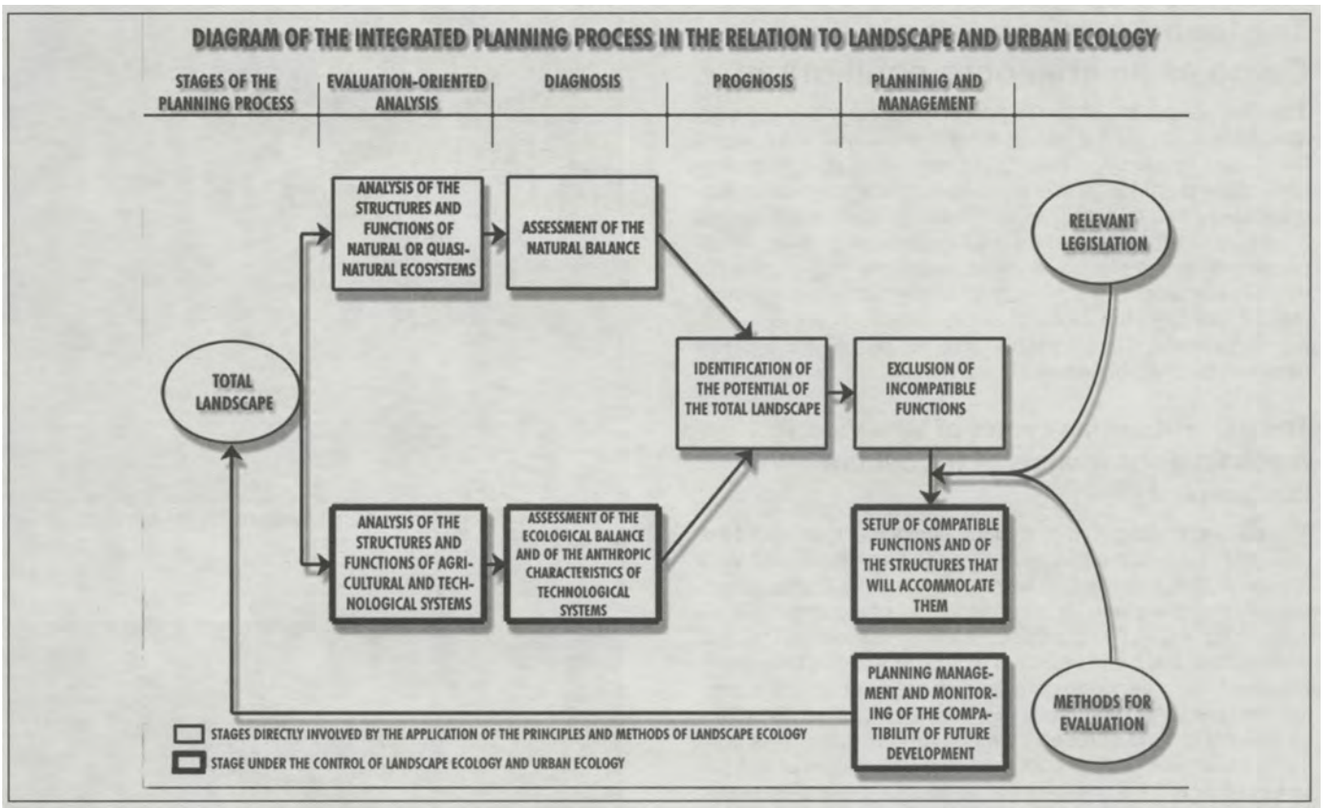


Fig. 1: The integrated planning process in the relation of landscape and urban ecology.

Fig. 2: An example of the concept of area of re-equilibrium – Insubria in Lombardy, a border region between Italy and Switzerland.

The landscape of northern Lake Como as an area of re-equilibrium

The characteristics of the region of Insubria make it a suitable case study for the observation of the transformations of the cultural landscape (fig. 3). Indeed, though administratively carved up, Insubria is extremely homogeneous physiographically and culturally, and it is completely autonomous from the other Lombard as well as from the Swiss landscapes. These traits would allow Insubria to play a valuable role of re-equilibrium with respect to the larger surrounding region, where all the productive functions are concentrated. For this reason it is a suitable area for one or more of the above-mentioned observatories.

The Italian-German center of Villa Vigoni: A possible observatory of the cultural landscape

The cultural characteristics and the ecological features of the site where it lies make the Italian-German center of Villa Mylius-Vigoni, in Loveno di Menaggio, on Lake Como, an especially suitable place for an observatory of the cultural landscape (fig. 4). A CD produced by the Institute of Design, Architecture and Land Planning (IDAU) of Ancona University, Italy contains a very rich database on the Villa and its potential, and presents the results of a research carried out jointly by several groups of researchers of various disciplines from some Italian universities coordinated by the author of this paper. The subject is the areas of re-equilibrium and the need for setting up a series of observatories on the cultural landscape, focusing on the Mylius-Vigoni estate (COLANTONIO VENTURELLI, 2001).

The history of this property, which lay on the route of the "Grand Tour," began in the mid-19th century. In this period the model of cultural landscape characterized by a system of villas and by long stays abroad by the rich European families became established. In this context, Heinrich Mylius, a Frankfurt banker who had been living in Milan for several years, bought the property for his summer residence, as was the custom of the Lombard high bourgeoisie. After the death of his only son, Julius, in 1830, Mylius decided to dedicate to his memory both the park and his art collection (fig. 5).

The park was designed according to the criteria of the German romantic garden – which were nearly unknown in Italy at the time – and was made to fade directly into the 40 hectares of wood that were partly used for farming (fig. 6). The physical characteristics of this layout reflect an exchange of concepts between Italian and German cultures which started with Heinrich Mylius and continued throughout the history of the family, up to the donation of the property to the German government by the family in 1983.

The Italian-German center of studies, set up after this event, contributes to keeping this tradition alive. Its history has allowed this complex to remain intact and homogeneous in the face of the transformations that have subsequently affected the landscape, and to stand as a valuable testimony of the early phase of this type of cultural landscape (fig. 7).

We feel that this site can and should play an active role, though not by being enclosed within the walls of a traditional museum but by allowing it to reach a larger public through interactive visits. There are therefore all the conditions for this handsome complex to achieve its potential as an eco-museum. This point of observation of the transformations of the cultural landscape can provide a valuable body of data also to the administrative bodies and to those in charge of the planning and management of land and the environment.

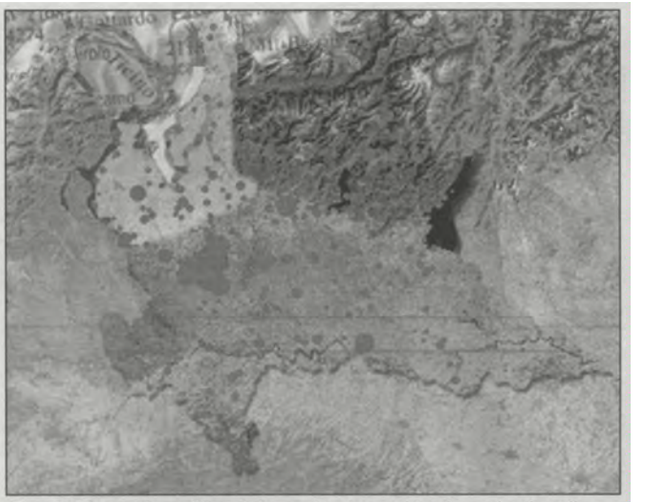


Fig. 3: The region of Insubria, a physiographically and culturally homogeneous area.

Fig. 4: Location of the Italian-German center of Villa Mylius-Vigoni in Loveno di Menaggio on Lake Como, Italy.

Fig. 5: Map of the area where the Villa Mylius-Vigoni is located, with the park in the southern part of the property.

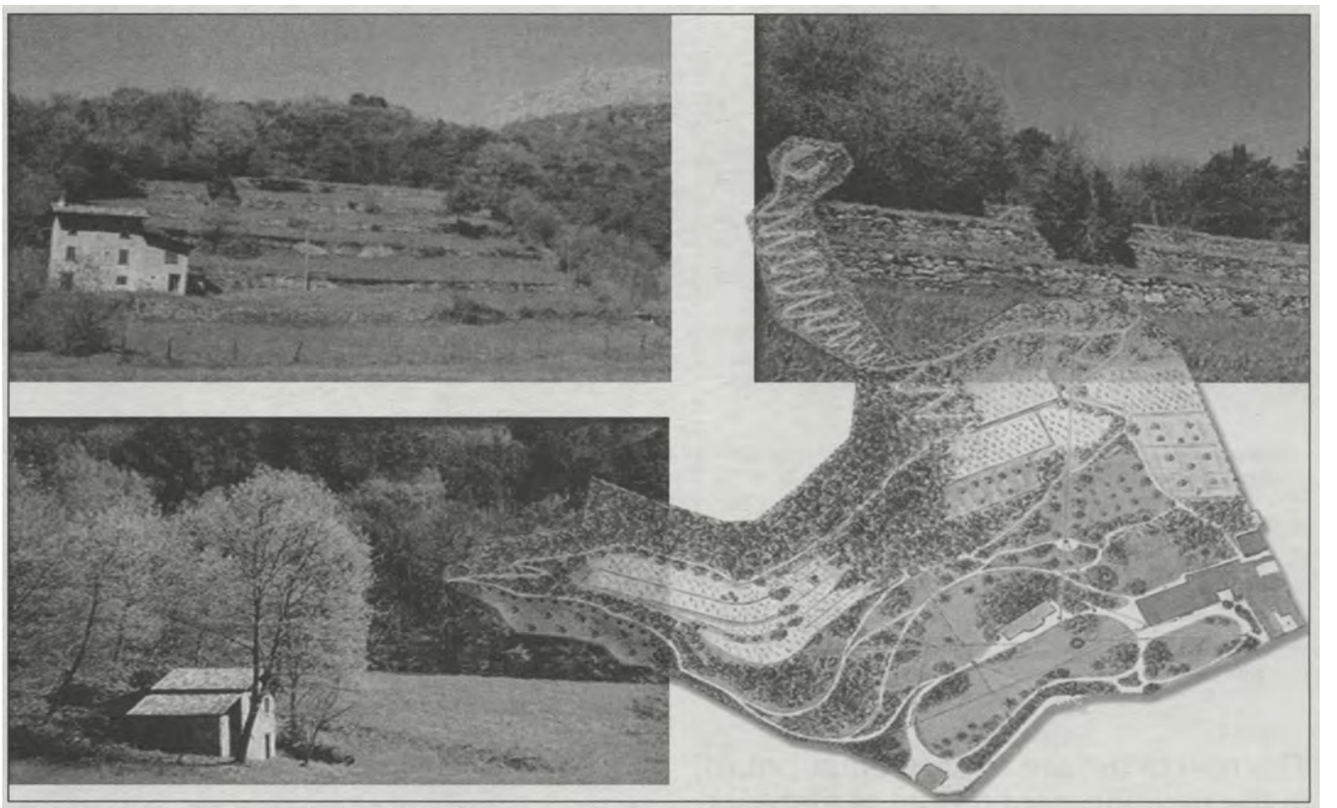


Fig. 6: Villa Mylius-Vigoni – The layout of the park and views of the overall development.

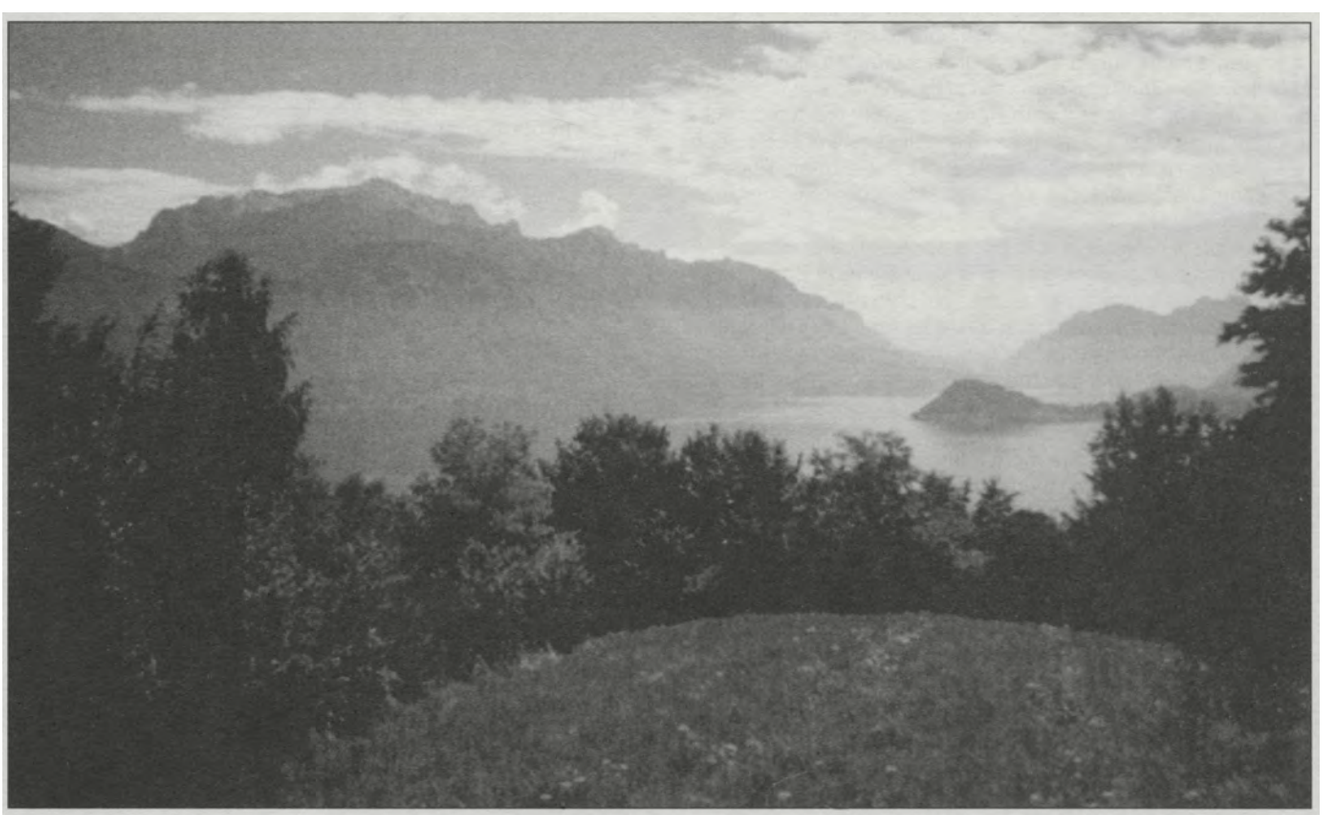


Fig. 7: Villa Mylius-Vigoni – The impressive landscape that still remains intact.

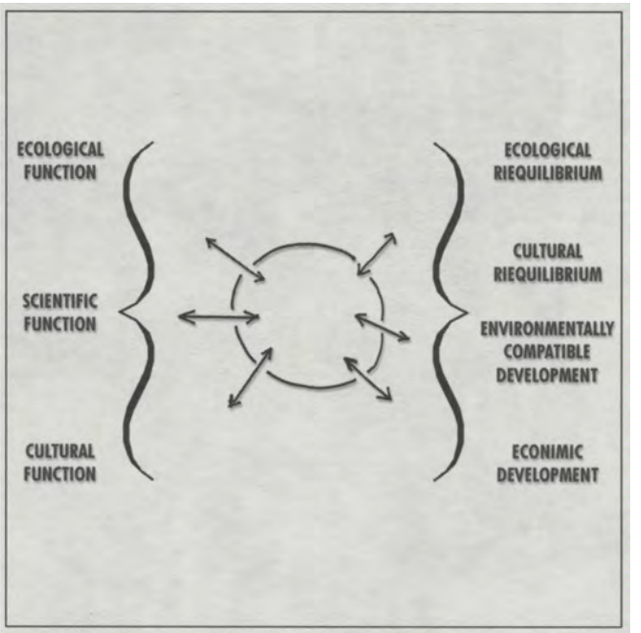


Fig. 8: The Italian-German center of Villa Mylius-Vigoni – The multiplicity of its functions and its contribution to re-equilibrium.

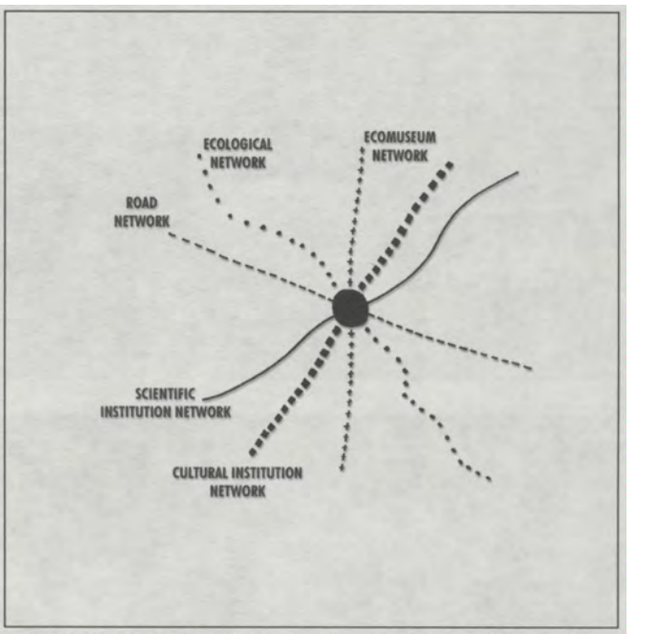


Fig. 9: The role of the areas of re-equilibrium in the development model of material and virtual networks.

The role of the areas of re-equilibrium in the development model of material and virtual networks

The multiplicity of the functions – ecological, scientific, cultural – that are concentrated at the Italian-German center of Villa Mylius-Vigoni can concretely contribute to the re-equilibrium of the region and, linked to those provided by the other points of observation, they can come out of the microcosm that generated them and connect to the larger scale of this typical cultural landscape in its wider area. Thus, if its role of ecological re-equilibrium is accompanied by that of cultural re-equilibrium, eco-compatible development can sustain economic viability (fig. 8).

This type of network is linked to a series of other networks, both material (e.g. ecological, the road system) and virtual (scientific institutions, museums, other institutions) which now irreversibly tend to characterize its future development model. Thus, the richer in functions the intersections among the different networks (i.e. the more numerous the networks that intersect at a given point), the more significant these intersections promise to be. And of course the more different the networks involved, the more interesting and varied the information provided. The biodiversity generated by a correct ecological management thus needs to be set in the framework of a wider, complex and correctly organized "multifunctionality." This multifunctionality will be the basis of the action of re-equilibrium exerted locally and by the whole area of re-equilibrium (fig. 9).

Conclusion

At the beginning of the second wholly urban century – to quote a very significant concept expressed in *Urban 21,* the report presented by Professors Pfeiffer and Hall – the issue is no longer and not only that of controlling and qualifying the growth of the individual urban areas, but rather of guiding them towards the creation of complex regional models aimed at developing the specific and different potential of a system of local and global networks (HALL and PFEIFFER, 2000). The areas of re-equilibrium and their observatories can provide great opportunities to this end.

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COLANTONIO VENTURELLI, R. (ed.) (2001), *Per un osservatorio sul paesaggio culturale,* CD (Ancona).

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Urban intensification in New Zealand

Barry Rae

The author is a consultant urban designer/planner/architect and Director of Barry Rae Transurban Ltd, consultants on urban development, based in Auckland, New Zealand. He is a graduate of the Athens Center of Ekistics and a member of the World Society for Ekistics (WSE).

The text that follows is a slightly edited and revised version of a paper presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

Introduction

New Zealand is a small country comprising two main islands located in the South Pacific.

Prior to the end of the 18th century, New Zealand was inhabited solely by the Polynesian Maori people of whom over 80 percent were concentrated in the northern half of the North Island. This settlement location in the north was the result of migration by sea from the north, the warmer northern climate, better conditions for cultivating sub-tropical food crops, and the availability of other food sources.

Initially planned European settlement of New Zealand was concentrated in the South Island as a result of the gold rush, the land wars of the northern regions and the relative ease of farming the open pastoral lands of the South Island. However, over time settlement from both internal and external migration occurred mainly in the north of the country, encouraged initially by the development of the dairy industry, the growth of forest-processing industries, and the exploitation of deepwater harbors.

Migration to the northern regions of New Zealand has been continuous throughout the 20th century, driven by the urban economy and by the warmer climate. Immigration has included people from the Pacific Islands and, more recently, from Asia.

Today, New Zealand has a total population of 3.8 million people, with some 50 percent of this population living in the northern regions of the North Island, and over 30 percent of the total population living in the Auckland region alone.

There is thus sustained long-term urban intensification occurring in the northern regions of the country, and particularly within the metropolitan area of Auckland.

Ecumenopolis

In the long-term future, major external migrationary pressures on New Zealand must be assumed to continue in the context of global population growth and distribution. If today's world population of 6 billion was evenly spread over world habitability zones with no significant limitations for extensive habitation, New Zealand would theoretically have a population of 40 million. Further, in about 100 years' time, the world's population is likely to double. In this global context, New Zealand's current share of the world's habitable land resources is inequitable and, in the future, likely to be untenable.

Over the last 100 years, New Zealand's average annual increase in population was 1.7 percent. Assuming this rate of growth could be sustained in the future, New Zealand could have a population of 20 million in 100 years' time. Assuming a continuation of past trends of regional population concentration, over 60 percent of these people are likely to live in the northern regions of New Zealand (around 12 million people).

The northern regions of New Zealand

Potential exists, within the northern regions of New Zealand, for a unique interconnected, linear, regional urban system based on the intensification of a multiplicity of centers and connecting corridors. This super-region is about 350 km long, but significantly constrained in width by topography and two coastlines.

Success of human settlements in New Zealand in the 21st century will depend largely on the strategic planning of this dynamic urban system on the macro scale addressing social, cultural, economic and environmental issues in an integrated way (fig. 1).

Fig. 1: Northern regional urban system of New Zealand.

Auckland region

Central to this northern super-region of urban intensification is the Auckland region. The Auckland Regional Council and all constituent city councils have formed a collaborative growth forum proposing a growth strategy for this region for the year 2050. This assumes a doubling of the regional population by 2050 with intensification occurring primarily within existing urban limits.

Intensification (mixed-use) is proposed to be focused around town centers and along major transport corridors. Associated with this intensification is the protection of sensitive natural areas and catchments.

However, statutory techniques for achieving this strategy are currently limited due to the lack of planning legislation at the regional scale.

Auckland City

Central to the Auckland region is the city of Auckland situated on a narrow isthmus between two harbors. The Auckland City Council has promoted Liveable Community principles in selected areas of the city where intensification will be channelled into areas where land use, transport and other infrastructure are integrated. This involves a system of mixed-use centers and corridors across the city based largely on main road and railway routes.

However, city planning legislation in New Zealand is limited to sustainable resource management focusing on the adverse effects of development on the existing environment. Unfortunately this encourages public "not in my backyard" attitudes towards urban intensification which will of course result in significant change.

However, Liveable Community strategies have been formulated for selected areas, identifying potential intensification based on capacity, pedestrian/cycle linkages, safety of the public realm, choice of housing, access to passenger transport, sense of place, social interaction and economic development and employment.

Neighborhood reconfiguration

A major task for the success of Auckland City in the 21st century is the reconfiguration of existing single-use, low-density, homogeneous neighborhoods which make up most of Auckland City.

The task is to transform existing urban areas into identifiable, mixed-use, diverse walkable neighborhoods within structural urban cells bounded by main roads and bus routes. Restructuring should involve high-density mixed-use development along the main roads and around railway stations, medium-density housing fronting public major open space and existing low-density housing retained elsewhere (figs. 2 and 3).

Housing types

Housing typologies associated with urban intensification in New Zealand must evolve indigenous to New Zealand conditions. Such typologies in the northern regions must be shaped

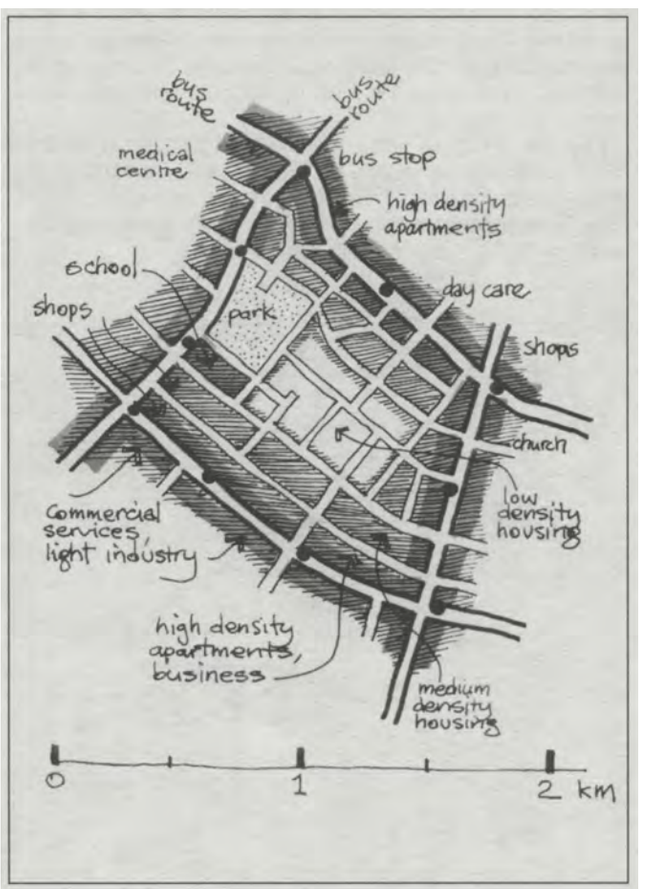

Fig. 2: Mixed-use walkable neighborhoods.

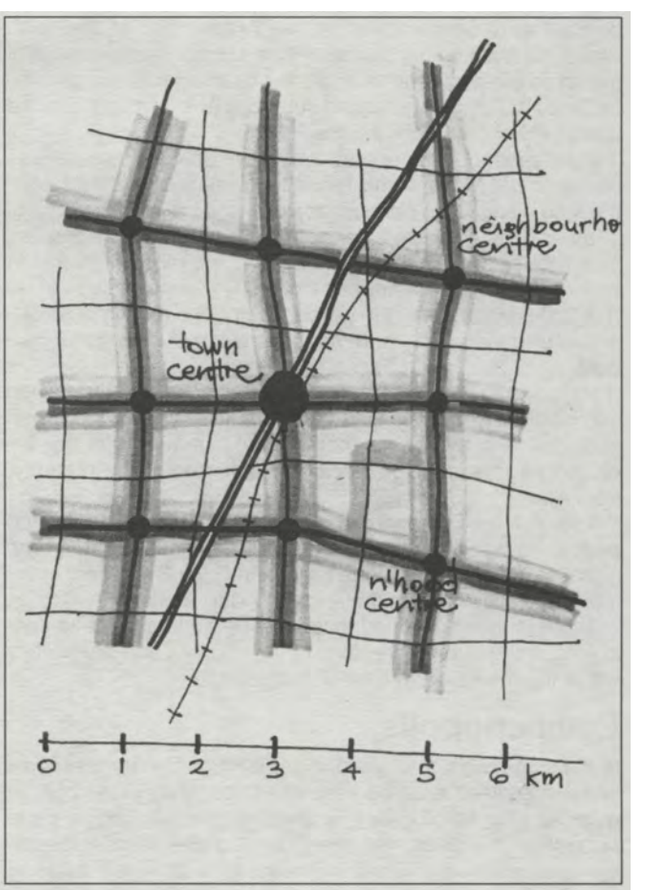

Fig. 3: Structural urban cells.

by the unique cultural mix, changing demographics in respect of household formation and age structures, the temperate coastal climate, the informal outdoor lifestyle, recognition of natural systems of heating and ventilation, and economic diversity including home-based business.

Criteria for successful intensification

The model shown in table 1 may help to generate criteria for the success of the city in the 21st century, particularly in respect of urban intensification.

Table 1
Possible criteria for assessing the success of the city in the 21st century

ENVIRONMENTAL SYSTEMS	ELEMENTS	CRITERIA	SPATIAL UNITS: Dwelling	Neighbourhood	Urban Area	Regions
NATURAL ENVIRONMENT	Air, Water, Land, Fauna, Flora	Landscape values		■	■	■
		Eco-system quality	■	■	■	■
		Fit to climate	■	■		
		Minimisation of energy	■	■	■	■
		Resource efficiency	■	■	■	■
		Fit to topography	■	■	■	■
		Food production				■
		Heritage values		■	■	■
		Bio-diversity				■
HUMAN ENVIRONMENT	Anthropos	Health & safety	■	■	■	
		Social & cultural wellbeing	■	■	■	
	Households	Maximisation of contacts		■	■	■
		Diversity of lifestyles		■	■	■
		Diversity of workstyles		■	■	■
	Society	Cultural diversity		■		
		Employment opportunities		■	■	■
		Economic opportunities			■	■
		Human development	■	■	■	■
		Demographic diversity		■		
BUILT ENVIRONMENT	Buildings	Shelter	■			
		Human scale	■	■		
		Permeability		■		
	Networks	Adaptability	■	■		
		Connectivity		■	■	■
		House type diversity		■		
	Open Space	Diversity of building type & age		■	■	
		Heritage values	■	■		
		Identity	■	■		
		Legibility		■		
		Robustness		■		
		Accessibility to facilities		■	■	■
		Transport efficiency			■	■
		Amenity values	■	■	■	■
		Quality of private & public open space	■	■	■	■
		Infrastructure capacity		■	■	■

A future for the historical city of Hikone

Takashi Doi

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Traditional Japanese settlements and landscape

• **Perceptual model of Japanese human settlements:** That the Japanese perceptual model of human settlements structure is very different from those witnessed in other parts of the world is not a pervasive idea. Let me explain this by taking the examples of four different civilization areas – Mesopotamia, India, Egypt and northern China – where cities were born along big rivers, all in desert or semi-desert landscapes, certainly not in woods and forest regions. The spatial structure of the cities in such areas has adopted naturally the convex shape that is needed in order to construct defensive walls around and to build the city with high density, protecting the people from enemies who could attack them rather easily, due to the flat desert ground on which cities were built. The result was a thoroughly man-made environment with very high density in terms of population and construction protected by strong walls.

The image of the earth or the image of the world in Mesopotamia and Mediterranean cultures (fig. 1) was expressed as a "circle" representing the horizon and a "cross" representing the line of the equator and its axis of rotation.[1] The Roman Templum, for example (fig. 2), symbolizes the world and the sky in a similar way. It was similar also in the Middle East, in Egypt and in some ancient Mediterranean regions. The symbol of the city or human settlements in general is said to be copied from the image of the earth or the world.[2] The hieroglyph indicating the word "city" in Egypt is similar or identical to the one symbolizing the earth or the world. And so is the case of a famous bas-relief showing city life in the Assyrian period (fig. 3). These provide sufficient evidence that human beings in their minds apply their world image on their settlements (fig. 1). At the central point of the model stands a vertical axis connecting the sky where God exists to the underground where the other world exists. This image of the world and the city in the ancient civilizations of the Middle East and the Mediterranean region has been inherited, I think, by the entire Indo-European part of the world and it is still valid at present.

The Japanese image of the world is a concave model, so to speak (fig. 4). Most villages in Japan are at the foot of mountains, surrounded by other mountains and forests. This may derive from the topography and the climate. The ancient people of Japan attached very great importance to living places surrounded by mountains and forests. So here too humans copy their world image into their settlements at all levels of the hierarchy, from room to region. Many ancient written documents in Japan provide evidence in support of this hypothesis. For example, in ancient times, the Japanese would select such places to locate capital cities such as Nara and Kyoto. Villages and houses were also made in such a way. I believe this tendency continued into later periods.

In this model the sacred places are not in the sky but in the forests and the mountains just behind the villages where their ancestors lie. In Japanese culture gods have been our ancestors. It is believed that the ancestors in the forests and mountains protect their descendants living in the villages. After sufficient time, ancestors move horizontally from the mountains to the "Sacred Place" beyond the ocean where they are believed to become gods. Everyone arrives there finally after death. In ancient times coffins were often made in the shape of a ship intending to cruise and arrive at the "Sacred Place" over the ocean. Until very recently pregnant women gave birth to their children in a temporal "birth hut" in villages along the sea coast – a custom that continued from ancient times, connected to their belief in reincarnation from the Sacred Place beyond the ocean.

Human settlements of Japan are places surrounded by mountains and forests with sacred sites behind the villages, which later become Shinto shrines at the foot of the mountains. People's strong sense of direction towards another world or a higher sacred place extends toward mountains and beyond the sea. Our consciousness of space thus extends rather horizontally, not vertically as in other parts of the Eurasian continent. In my view this is the reason why our architecture as well as our townscape and village-scape show, in their design, predominantly a horizontal tendency. I believe that the uniqueness of our settlements comes from the belief that I have

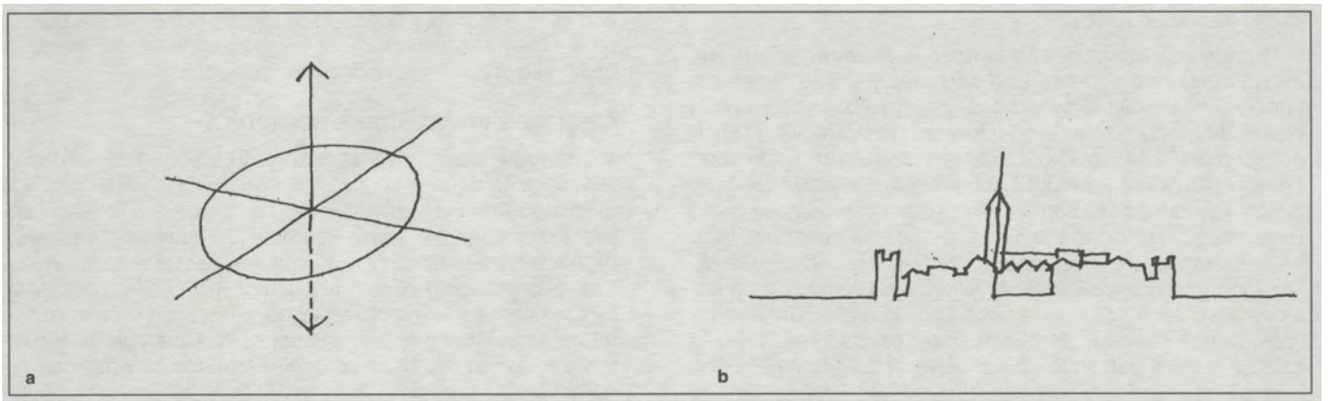

Fig. 1: Image of the world in arid areas (a) and the city image (b).

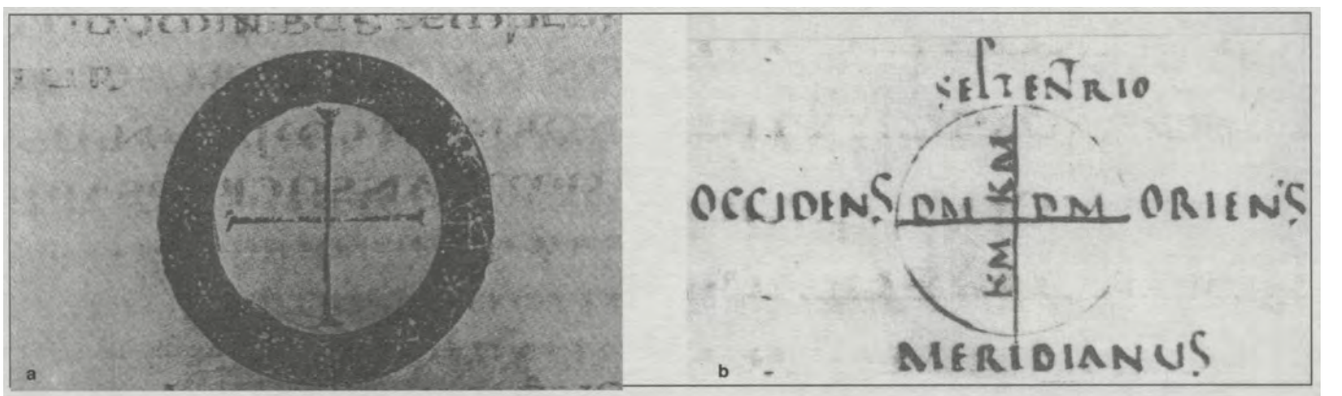

Fig. 2: Roman Templum of the sky (a) and of the earth (b). (*Source*: Joseph Rykwert, *The Idea of a Town – The Anthropology of Urban Form in Rome, Italy and the Ancient World,* London, Faber and Faber, 1976).

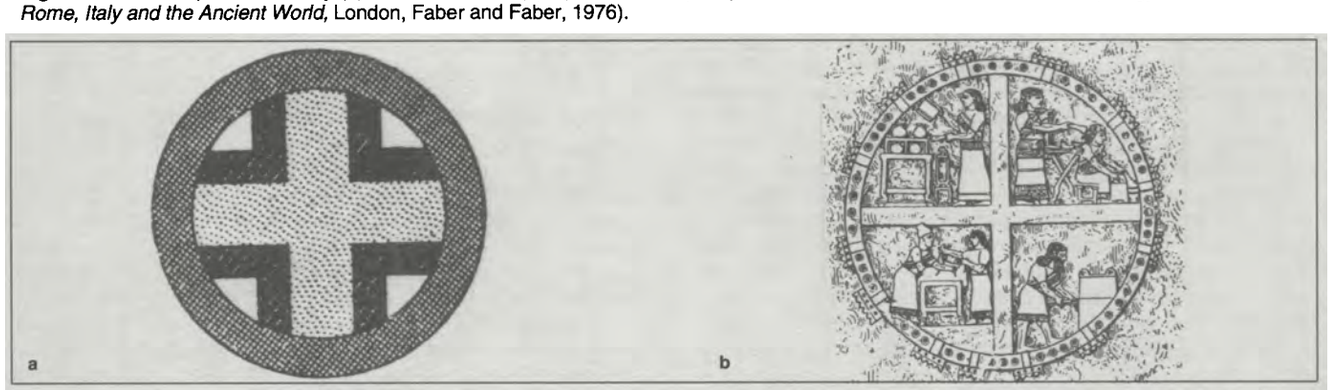

Fig. 3: The Egyptian hieroglyph meaning "city" (a) and an Assyrian relief showing city life (b). (*Source*: Leonardo Benevolo, *The History of the City,* London, Scolar, 1980).

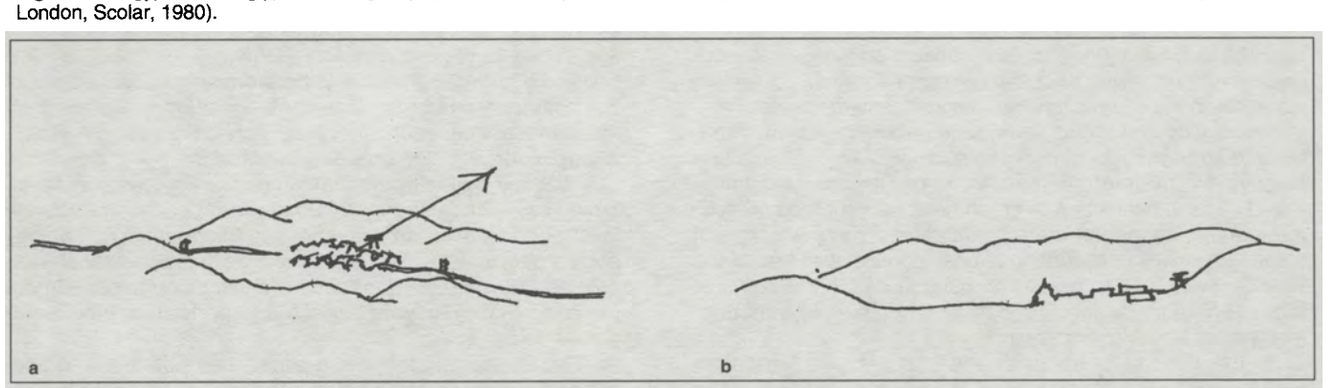

Fig. 4: The Japanese image of the world (a) and the image of the settlement (b) as a copy of (a).

briefly discussed above.

• **Symbiosis of man and nature – Satoyama (village mountains) rice paddies and settlements**: The belief that humans are protected by surrounding mountains and forests makes them rely on Nature. Nature and Man co-exist in such environments. Mountains and forests – named "Satoyama" (village mountain) – brought rich presents to the inhabitant; they provided food like bamboo shoots or mushrooms and wild vegetables, timber and other materials to construct their houses, various other utensils for their living and, above all, firewood and charcoal as their energy sources, and sometimes arms such as bows, arrows and spears. Furthermore "Satoyama" provides fertilizers for rice paddies, usually located in the areas on the lower sides of the village. Rotten leaves and organically rich soil gathered from "Satoyama" are excellent fertilizers for rice paddies. Besides this, the villages used as fertilizers their various wastes including food remains, bath drainage and even their excretion to the extent that no more waste existed. In other words, in the way of life of the traditional Japanese human settlements one witnesses a complete ecological cycle governing the relationship between people, villages, paddy fields, mountains and forests. It can be said that people — villagers and even city dwellers — had coexisted in harmony with Nature.

• **Townscape of Japanese traditional cities:** Reflecting the typical Japanese model of human settlements, most traditional villages, towns and cities were surrounded by nearby or far-off forests and mountains. In the towns there were many woods – on river banks, in temples, in shrines – and gardens for every house, especially in the houses of the Bushi-class.

Western missionaries in the 17th century reported that even Edo, which was considered the largest city in the world at that time, was "A Capital in Forests." Many Western observers who visited Japan around the end of the 19th century – after the opening of the country – also wrote that the concept of city in Japan had been completely different from the one which they had known in the Western world, the Middle East, India and China. In the huge city, there were no big monumental buildings, but plenty of parks, gardens and woods. People liked to spend time in such natural surroundings during holidays – of which they had plenty. Although there is some tendency for growth in a vertical direction, such as in the case of feudal castle towns like Hikone, in the design of the townscape the intentions for horizontal expansion overwhelmingly prevailed – another difference of the Japanese city from most of the cities in other parts of the world, in the Eurasian continent.

These result from the perceptual model of Japanese settlements.

Modernization and Westernization

After the Meiji Revolution in 1867, Japan tried furiously to modernize and Westernize its society. Industrialization, population increase and accompanying urbanization at large scales have tremendously changed human settlements in Japan, especially in large metropolitan areas such as Tokyo, Osaka and Nagoya. In the metropolitan areas nature has been minimized. The vacant lots with green have been utilized to facilitate various usages of metropolitan life. The townscape of these large cities is becoming almost identical with that of the Western world. Photographs of many places in the Tokyo of today cannot be distinguished by ordinary people from photographs of New York or Berlin.

In the world of globalization the unique characteristics of the Japanese settlements and the identity that we have described above are precious for the Japanese themselves as they reflect the rare harmony between climate, nature, history and culture that was achieved by Japan in the not too distant past. They are also precious for the people in the world, as Japanese conditions enrich global cultural assets.

Changes in Japanese society

• **Changing population structure:** The population of Japan will reach its maximum of 127 million in 2006. After that it is estimated that the population will be decreasing to reach approximately half the above figure in 100 years, if the present (2000) birth rate trend of 1.35 children per female continues. The overall aging of the population has been constantly increasing and is expected to be advancing further in the future, as in other developed nations. The average life expectancy in Japan has been recently estimated by American researchers to be over 90 years in 2050. In other words, Japan will become a society with the highest percentage of elderly population in the world since the average life expectancy is the highest in the world. The elderly who are over 65 will be 25 percent of the total population in less than 10 years, and this number is projected to reach 33 percent in the year 2050.

The number of single-person families – at present about a quarter of the total number of families – is expected to reach a little less than one third of the total number of families in 20 years' time. In other words the great number of elderly and lonely people is estimated to be one of the most serious problems in Japan in the near future. Japanese cities are not at all prepared for such conditions.

The populations in the central districts of metropolitan regions are slightly recovering in various areas depending on the policies adopted by local governments. Some symptoms are appearing that suburbanization could possibly be at an end due to the increase of aged people and one-person households as well as the increasing number of adult working women and the decreasing number of children. These factors are having hampering effects in diffusing population into the suburbs.

The central cities again seem to be gaining in importance.

• **The influence of Information Technology:** The influence of Information Technology (IT) on Japanese society is not yet clearly apparent. For example, the phenomenon of male adults working at home in remote natural places, detached from their company's headquarters in the city, that Alvin Toffler suggested in his book *The Third Wave* (William Morrow, 1980) as the electronic cottage, is manifested only in very limited cases. The number of women – many of whom have to stay at home due to their role as housewives and also some elderly retired persons who have started working at home through the Internet using their houses as SOHO (Small Offices, Home Offices) – is not very large either.

The impact of Information Technology becomes obvious in individualizing or personalizing tendencies witnessed in families. The use of personalized telephone, television, the Internet and other media seems to be promoting individualization. Each family member tends towards a pattern of life relatively independent from each other and connecting through personalizing media with the outside world and the set of diversified ties dictated by their personal interests. On the other hand, family ties – once strong in Japan – are becoming relatively looser and weaker. In this emerging Information Technology society people act individually according to their personal interests and develop relations rather freely, being released from the roles that they were expected to perform in their workplaces and at home.

The increase in Internet relations and personalized telephones are accompanied by a rise in the number of physical trips. In other words, non face-to-face communications through the Internet and other personalized media enhance face-to-

face communications considerably – a conclusion contrary to the one reached by Toffler and his "electronic cottages." From this we may deduce that in Japan the popularization of the Internet will not necessarily diffuse population, a tendency which acts as a further hampering factor for suburbanization.

• **Need for second homes and the creation of a Garden Megalopolis:** In modern Japanese cities the cultural tradition to live within Nature has been continuously oppressed by ever increasing densities. For most inhabitants, possessing a house with a garden is no longer possible. The natural surroundings outside their homes are disappearing as cities develop. The lack of opportunities for contact with Nature may have produced pathological problems especially among children and elderly persons. In any future effort to re-make our environment, some serious consideration of the need to bring Nature back into the cities must take priority.

In the large metropolitan areas of Japan, people live in rather small structures irrespectively whether they live in detached houses or in apartment buildings. It is true that, historically, we have been living in rather small houses. But the average floor area of a house in today's metropolises has become smaller or at the most almost equal to the national average a hundred years ago and comparatively lower than currently in other parts of the world.

One solution to this problem for city dwellers who cannot help having small city houses is to acquire second homes in the countryside. In this way they may enjoy life in Nature and, at the same time, contribute to the revitalization of countryside areas. This may also constitute an effective government policy both to revitalize the ailing Japanese economy and to improve the volume of carbon dioxide by keeping a huge amount of carbon in the timber used for the wooden structures of second homes.

In this way, proper city redevelopment based on the decrease in population pressure on metropolitan areas as well as on countryside development may possibly turn the Japan Megalopolis into a Garden Megalopolis and help revive the Japanese urban tradition for people to live in Nature and with Nature.

• **Globalization and local identity:** Globalization prevails in every part of the world, particularly in the field of the economy. Metropolitan areas, especially their central districts, where economic wealth is produced, could not escape from it, given the severe competition witnessed worldwide. As a result, the central business districts of almost all metropolitan areas tend to become almost identical. I do not know whether economic competition will change in the future or not. What I do know is that so far large metropolitan areas in Japan or elsewhere cannot help but take such a, so to say, dictated global shape in their main parts. However, local cities can remain outside the influence of such international competition. Each has its own identity, its history, its climate and culture reflected in the life of its inhabitants. For the Japanese – and for human beings as a whole – keeping the identity of every city and the diversified wealth of the particularities of human community expression is very important. The local city should keep both its local identity and its Japanese identity which both reflect a fantastic unity and, at the same time, the rich diversity of our cultural wealth. If no action is taken, this wealth will be lost as is apparent in parts of major metropolitan areas.

Hikone

Hikone is a special case among Japanese cities due to the vivid presence of precious remains of its history. Not only can visitors to Hikone recognize what a feudal castle city in Japan was like but they can also experience it by walking through the city and feeling it with their bodies and their minds. In recent years, many people in Japan have come to realize that we are conforming too much to Western influence and losing many good aspects of our values, and many show more awareness concerning the importance of our own cultural identity.

• **Strategic location from ancient times:** Hikone has been located at a point of strategic importance throughout history. Its site in the Kinai district was:

- adjacent to the capital areas where Nara, Kyoto and other short-lived capital cities had been located from around the end of the second century AD to 1868; and,
- on a key point along the main routes to the northern parts of Japan and the coastal areas on the Japan Sea side (fig. 5).

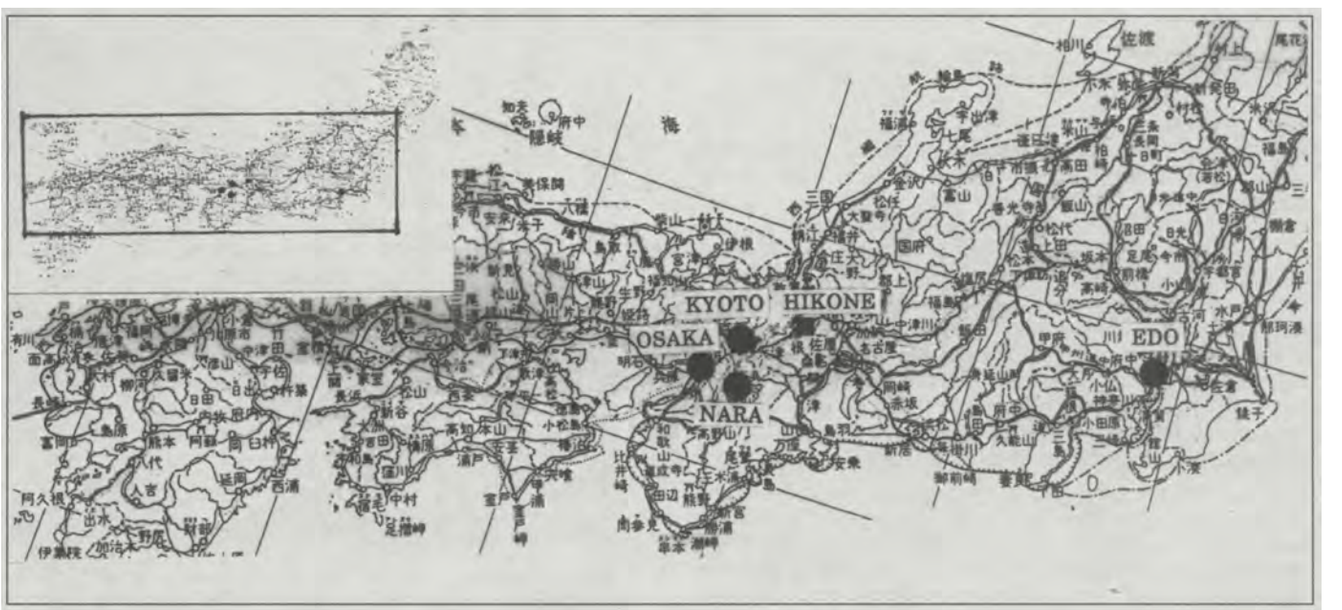

Fig. 5: Japan – Location of Hikone in connection with the location of former capital cities (Edo, Kyoto, Nara, Osaka) from ancient times to the 19th century and with the main sea and land routes.

Lake Biwa stretching alongside Hikone was an excellent waterway and gateway leading to the capital areas. The region around Hikone kept watch and checked on transportation in and out of the waterway which then took the only effective land route heading towards the northern part of the country (fig. 6).

Fig. 6: Location of Hikone in connection with Lake Biwa and the main transportation routes (19th century).

Because of this location the area played an important role in the history of the country, especially after the medieval feudal period. From 1582 onwards, the area was governed by the powerful feudal lord Hideyoshi who had finally brought the entire country under his rule. His generals occupied Sawayama Castle in turn until Hideyoshi's most powerful general Ishida Mitunari finally occupied the castle. After the death of Hideyoshi, Mitunari who ruled the western half of the then divided Japan fought in 1600 against the powerful Tokugawa leyasu who ruled the eastern part of the country and lost the battle of Sekigahara – in the gateway area near Hikone. Tokygawa had established his headquarters, the Tokugawa Shogunate, in Edo – which is today's Tokyo.

• **A feudal castle city:** After the decisive war was over, Ii, one of the highest officers of Togugawa, was ordered to rule and watch over the previously enemy regions within the entire western part of the country – particularly the capital region of Kyoto and Hikone. Ii moved the castle from Sawayama to a nearby site Hikone along Lake Biwa and in 1603 he started constructing the city and the castle. In 1695 the population of Hikone was estimated to be a little over 36,000, of which the Busi (Samurai) class consisted of around 20,000. At that time, the population of the area around Hikone ruled by Ii was over 250,000. Between the 15th and 19th centuries, the surrounding villages did not witness much change either in terms of built-up area or of population.

The city consisted of the castle, the residences for the lord, governing offices, a detached residence for lord Ii facing Biwa Lake, the Bushi districts, and the Chonin (merchants and craftsmen) districts. Triple moats surrounded the city and the castle. The lake, the marshland and the river acted as additional defensive barriers for the city (fig. 7).

With regard to the overall townscape, one could recognize:

- In the Chonin districts, rows of wooden houses for merchants and craftsmen consisting of only a ground floor structure usually accompanied by attics for servants and storage;
- In the districts of the Bushi class, houses, usually detached, surrounded by green areas and gardens, all within a green city full of trees and woods, not only because of the gardens of the Bushi residents but also because many temples and Shinto shrines had considerable gardens with plenty of trees – even the row houses of merchants and craftsmen had comparatively smaller gardens in their backyards.

Furthermore, at the northern end of the city there were the castle hills covered with green, coupled with a range of mountains in the east. To the south, the city was demarcated by a river on whose banks rows of huge trees had been planted. To the west, facing Lake Biwa, there would have been huge bushes – as indicated by the rest of today's lake shores.

To conclude, in the feudal period, vegetation prevailed within the city of Hikone and its surroundings as in other historical Japanese cities.

Fig. 7: Hikone around 1820 – The city consisted of the castle (1), the residences for the lord (2), governing offices (3), a detached residence for the lord (4) facing Lake Biwa (5), the Bushi districts, and the Chonin districts.

Present problems of Hikone

• **Townscape after the Meiji Revolution**: After this revolution Japan tried to import Western ideas and technologies. Urbanization started attracting population from rural areas to several metropolises such as Tokyo, Osaka, Nagoya, Hiroshima, Kitakyusyu and others.

Hikone, due to its inland location, its limited population and the lack of land in its hinterland, did not fulfil the conditions needed to become a center of modern industry. It has remained until today a local center with:

- 14,000 inhabitants in the old quarters;
- 40,000 including newly developed suburbs;
- 100,000 within the city boundaries which include many settlements in rural areas continuing from olden times; and,
- 300,000 including its hinterland population which is gradually declining due to the flow of people towards metropolitan regions.

Nevertheless, even in Hikone many modern reinforced concrete constructions – factories such as silk spinning and international-style office buildings – sprang up after the Meiji revolution. Multi-storey white box-like buildings with flat roofs have been invading and destroying many districts of old traditional two-storey wooden houses; ugly electric poles and wires everywhere in the city skyline have been destroying the traditional harmony of Japanese cities and towns. Hikone could not escape this modernizing process that has forced – through modern Western-type invasions – huge changes upon the traditional Japanese cities.

Compared to other Japanese cities, however, Hikone has considerable remains from the past which have escaped total destruction by modern forces, particularly some townscape elements of the feudal castle city such as the castle itself – which is a National Treasure – the castle mountain, some of the moats (although most of the outer ones have been filled in to become streets for cars), some of the traditional street patterns and a limited number of old houses (for the lord, the Bushi cast and merchants).

Original office buildings and the official residence of the

Fig. 8: Partial view of central Hikone with the restored governmental facilities and official residence of the lord, the castle and Lake Biwa.

lord have been restored (fig. 8). Rows of houses on both sides of some widened streets for cars have been restored to the traditional wooden style of two-storeyed houses (fig. 9).

Hikone is one of the few settlements in Japan which possess considerable sets of remains from the traditional "feudal castle city." There is still, however, a lot of confusion as to the action needed in order to re-establish, in a most effective way, the townscape of the original "feudal castle city." Due to the mixture of modern multi-storey apartment buildings, office buildings and shopping buildings with the rows of old wooden houses and remains of the castle area, this original townscape has been diluted considerably.

Hikone's most imminent problem is to reconstruct its overall townscape to fit the remains of the old feudal city. To return to the past and reconstruct the city as it was is out of the question. But there is no doubt that we can – and we must try to – avoid the confusing present, secure a good living environment and re-establish a new townscape in harmony with the remains of the past.

• **The need for street life and gathering places:** We have seen that living conditions in feudal settlements like Hikone, rich in green areas inside the built-up area and in its surroundings, were considerably good.

In traditional towns, streets were full of pedestrians with an active human life – chatting among the people within a neighborhood, children playing, enjoying the outdoor cool of the evening on hot summer nights before going to sleep, performances by a variety of petty pedlars, travelling salesmen and repairmen. Streets were lively outdoor "living rooms" with all sorts of socializing opportunities. A considerable portion of daily life took place in the street. Today all these activities have been wiped from the streets by cars and changing life patterns. The once pedestrian-friendly streets have been totally occupied by cars, severely worsening in many ways living conditions in the town. Fortunately, some of the temples and Shinto shrines that are still available in the city, together with the castle mountain and other castle areas, can provide resting places for citizens. But they are not enough, either in number or in distribution and proximity to residences so as to replace the traditional outdoor living space on the streets just outside each house.

We have to be prepared to provide substitutes for outside neighborhood living and for use of the streets. Building outdoor places for people to get together is of extreme importance for Japan as a whole and for Hikone, more particularly, given the fact that the number of lonely people are expected to increase rather drastically and the family structure is becoming weaker and individualizing. Outdoor meeting places such as small pocket parks located near residential areas of the city are absolutely essential for the mental health of citizens.

Fig. 9: Hikone – Widened main street leading to the castle; the wooden buildings on both sides of the street are built in traditional style.

• **Narrow streets and lack of parking spaces in the old quarters:** These constitute additional weak points in the structure and functions of the Hikone of today, similar to many traditional towns in the world. The difficult access to the central part of the city and to the shopping facilities traditionally concentrated there, has resulted in the attraction of people from surrounding areas to some new shopping centers with large parking lots on the outskirts of the city. Further to this basic economic problem, narrow streets and the lack of parking spaces in the central part of the city result in worsening the overall living conditions of citizens.

Authorities and inhabitants are certain that something has to be done about these problems but they are also aware of the dilemmas involved in an action plan implemented in the past for the widening of some streets (fig. 9). But action was restricted only to the main streets: any more extensive operations would have resulted in the destruction or removal of rare and precious old wooden houses.

• **Economic plight and future potential:** The current economic plight that characterizes Hikone limits its chances for renovation which is badly needed and the prospects for the revitalization of its economy call for careful and realistic consideration of the potential that its rare – but still limited – resources provide. The attraction of forceful industries, which would replace its once prospering and now disappearing spinning industry and would revitalize the city's economy, is rather improbable. On the other hand, central districts near the castle with their decreasing and aging population are not very active. In fact the limited size of the city and its small hinterland population of about 300,000 cannot expect much from industry and commercial activity.

The only case of successful intervention and relative prosperity due to the attraction of tourists is a small area near the castle where the streets were recently widened and houses as well as shops were restored in traditional style (fig. 9) – an effort that was made possible due to financial assistance from the central government.

The above makes it clear that further to the improvement of its overall urban functioning and the commercial activities concerning the city itself and its rather small hinterland, the future of Hikone's economic prosperity would depend on enlarging its cultural tourism activities based on the wealth of its historical assets that have not yet been sufficiently explored. When the effort for re-establishing more clearly the identity of Hikone as a special "feudal castle city" succeeds, there is no doubt that cultural tourism to the area will greatly increase due to the expected increase in public awareness about the need for cultural identity and the values involved in Japanese culture.

Furthermore the two universities already existing in the area could and should be considered as important sources for – and effective contribution to – revitalizing the city which until now has not been the case.

• **Landscape of Hikone's surrounding areas:** In the fertile countryside areas surrounding Hikone, the inhabitants of many compact settlements that have existed there from ancient times no longer live on rice cultivation. Only a small portion of the village families depend on agriculture in general. Income from agriculture alone is usually not enough to support family life except in a few exceptional cases. All or some members of the remaining families are white-collar workers or salesmen in Hikone, in Ohtsu – the prefecture capital – or even in Kyoto, commuting from the villages where they continue to stay on land inherited from their ancestors. This means that they may easily sell the land to buyers from outside and, in this way, disturb the landscape of the countryside.

Until now no major changes have taken place in these villages since they are not in the direct vicinity of the big city and not at a distance permitting daily commuting to work in big metropolitan areas such as Osaka or Nagoya. But the area will soon be disturbed by an anticipated major influx of people from metropolitan areas seeking to live in nature and building second homes there.

A successful future for Hikone

What could be considered as success for Hikone in the 21st century? I think the answer should be in achieving positive results in the following five issues: Townscape, Transportation, Economy, Social structure, and Sustainability.

• **Townscape:** Hikone must be healed from confusing disturbances. A major effort is needed toward re-establishing clearly its identity and image of an urban Japanese settlement with proper characteristics in harmony with the townscape of the traditional feudal castle city. Hikone could achieve this by keeping, restoring and enhancing its historic remains, and by adjusting the design of newly constructed residences and other buildings as well as its future development in style, height and volume, in harmony with the castle city environment, increasing at the same time the green element in the city according to the practice followed by the traditional Japanese town.

• **Transportation:** A shuttle bus system connecting large parking lots at the east and west end of the old part of the city would keep vehicles away from the old parts of the city as much as possible (fig. 10), leaving streets more free for pedestrians, keeping the townscape of the old city less disturbed and contributing to the creation of a better living environment.

Further to the above, the shuttle bus system will contribute to the increase of people from the surrounding areas going shopping in Hikone, and contribute considerably to the eco-

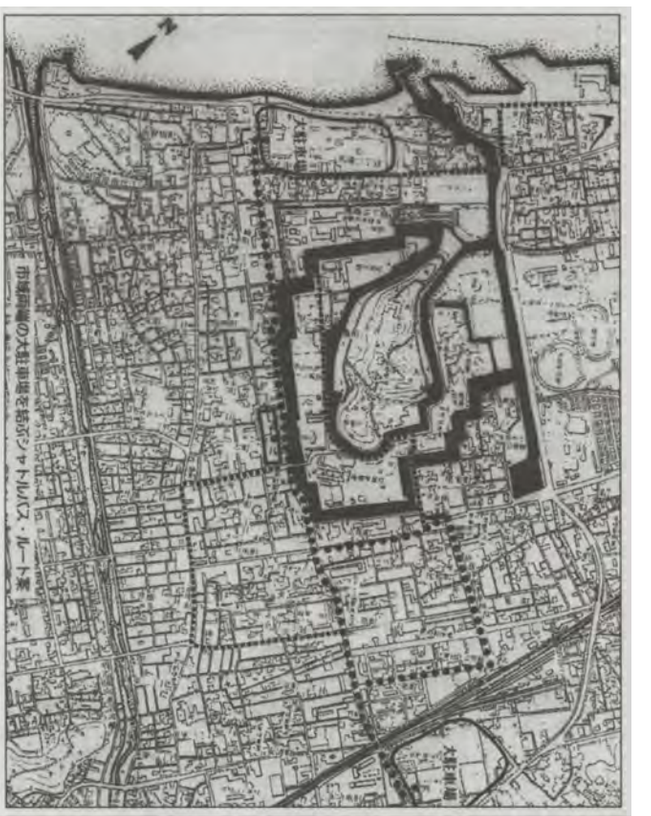

Fig. 10: Hikone – Proposed shuttle bus routes with large parking spaces on both sides of the old quarter.

nomic revival of the central city. The number of tourists will also increase since the large-scale parking lots will make access to Hikone and the surrounding rich historical wealth easier for small groups of visitors.

• **Economy:** This directly depends on the re-establishing of Hikone's identity as a traditional castle town. It has the potential to become a powerful means for the revitalization of the economy of the city as a whole and of the central district through the attraction of cultural tourism, not only to Hikone itself but also to its neighboring areas, where a number of other historical cities and a variety of sites exist and where the beauty of villages and the traditional harmony between nature and built-up areas are still respected. Using these assets, diversified cultural tourism would be possible throughout the region making Hikone its core. Besides visiting historical sites, experiencing nature and village life would be an attractive alternative for an ever increasing number of Japanese urban travellers.

• **Social structure:** The city must be prepared for the expected social changes to which we have referred in earlier parts of this paper. The most important change is the increase in the number of people who live alone – a reality reflecting the aging of the population and the weakening of family bonds. The city has not been prepared for such changes, since the changes have come so rapidly. The creation of small pocket parks and walking paths with trees and the increase of green areas in all parts of the city will facilitate lonely people to socialize and keep each other company and, at the same time, it will contribute to the overall effort of Hikone to regain its traditional Japanese identity, as we have already stated earlier in this paper.

Besides these "hardware" recommendations, there are many other kinds of "software" ways and means which would improve social intercourse. Conscious and systematic action towards achieving this goal is urgently needed.

• **Sustainability:** Today's cities must be sustainable as much as possible, and among the prerequisites for achieving this sustainability are:

- keeping urban activity areas compact in terms of both size and density; and,
- rendering today's systems similar to those of the traditional recycling society.

Concerning the first point, I would like to stress that Japanese society has lived at high densities in a very labor-intensive way on its arable land – relatively small in area if compared with its population. The high productivity per unit of its rice paddies cultivation has made this possible. This high intensity in the use of land since ancient times is reflected in the strictly limited size of village areas which was dictated by the need not to decrease the size of paddy fields.

Although today suburbanization has invaded the cultivated areas in the vicinity of the city, on the contrary in the countryside regulations concerning change in land use for residential and industrial development are still rather strict. But the invading forces are so powerful that, in one way or another, they will gradually advance even in the countryside. One such pressure will come from city dwellers seeking second homes to live with nature – which is not possible in the globalized metropolitan region.

One of the problems to be solved, related to this unavoidable pressure, is to examine how to allow such uses for newcomers and, at the same time, keep inhabited areas compact. By limiting the construction of new houses in the old inhabited areas, this seems quite realistic and in principle feasible, particularly in view of the fact that the population is expected to decrease drastically.

Another problem is to encourage good relations between old residents and the newcomers who may not be there permanently but periodically.

In any case, it becomes clear that we have to study, define and establish effective ways to keep the high density living prevailing in Japan from ancient times even into the future by restricting the extension of urban uses into agricultural land and in the countryside. This is one of the powerful ways to establish and keep sustainability.

The second prerequisite for a sustainable city is the development of a recycling system society. Traditional villages were based on complete recycling systems, established even in the relation between villages and cities. It is of course not possible to go back to the ancient way of life. But we have to construct sustainable systems in today's city and its surroundings, following the principles on which the traditional systems were based.

In olden times people from the surrounding villages would come to Hikone to sell vegetables or other crops and buy various city goods to take back to their village. But they would also take city dwellers' excretion and other wastes to use them as fertilizers. In the past when small-scale economy prevailed, there were plenty of direct interactions between Hikone and the surrounding villages – a reality that has constantly decreased and is tending to disappear due to today's large-scale economy even in terms of agricultural products. In the Japan of today, agricultural goods are only available through wholesale markets and supermarkets based on large-scale systematic distribution.

On the other hand, there are firm indications that we may soon witness drastic changes in agriculture, particularly when people grow vegetables and other agricultural produce mainly for pleasure as part of their hobbies. This is already happening on the initiative of older people who have retired, live in rural areas and are engaged in growing vegetables at a small scale, not only as a hobby but also for their own family's consumption – or for sharing with neighbors. This phenomenon may increase considerably if and when many more city dwellers flow into the countryside to enjoy agricultural life on a part-time basis. The increased volume of such products – vegetables and other crops – could be sold by the producers themselves at small local markets, for example in the open-air markets to be created in the old quarters of Hikone, helping in this way to revive the local economy by the introduction of ecological products which become both desirable and affordable for people who will tend to become more affluent. We do have such experiences internationally, but the examples in Japan are still very rare.

Relevant to the issue of the need for a recycling system society is the example of timber used for the construction of houses. In the Japan of today, we have been building two times more houses per population unit than the USA or Europe and because of prices we have been using imported timber. Furthermore, the wooden houses that were built after World War II in Japan have a lifespan of around only 30 years, while the life of those built in the USA and Europe during the same period is 100 years or more. This typical scrap and build process which has continued until now may be due to the poor quality materials used, the small floor area per unit and the rapid changes in lifestyle, reflecting relative poverty during and after the war as well as a huge urbanization pressure.

With the increasing affluence in Japan, new houses are gradually becoming larger and better quality. Recently, urged by the need for change in the economic structure and sustainability, people are becoming aware of the necessity to use locally made timber materials for the construction of their own houses even if they are more expensive than the imported

ones, and to try to prolong the lifespan of their houses to 100 years – three times the current one. Besides this, people have started to try many possible ways to increase and improve conditions of sustainability, by reducing, for example, the amounts of home waste and energy consumption with higher capacity insulation technology.

The promotion of local economy, recycling and sustainability of the environment in Hikone and its broader area would constitute important conditions for the success of the city in the 21st century.

Preservation of rural settlements: The many small – once rural – settlements in the countryside surrounding Hikone will have to be kept in such a way that their landscape and villagescape embody and extend the traditional Japanese identity. In this way, the area together with Hikone itself will be an example of the way, I believe, we should remodel today's rather tainted settlements within the framework of a more purified Japanese Garden Megalopolis – probably with the exception of the central portions of metropolitan areas which will tend towards an internationally identical townscape and structure, deriving from the severe global economic competition.

Hikone and its surrounding areas will be one part of the Japanese Garden Megalopolis where people will live in nature and co-exist with nature – a mode of life reflecting the traditional Japanese landscape and structure of settlements. In this Hikone will also contribute to establishing sustainability at the large scale.

Notes

1. Christian Norberg-Schulz, *Il Mondo dell' Architettura* (Milan, Edizioni Electa, 1986). Taken from the Japanese edition.
2. Mircea Eliade, *Das Heilige und das Profane – Vom Wesen des Religiösen* (Hamburg, Rowohlt, 1957). Taken from the Japanese edition.

Integration of the former Panama Canal Zone into Metro Panama City

Alvaro Uribe

The author, an architect-planner, Urbio, S.A., Panama, graduate of the School of Architecture, University of Panama, the Institut d'Urbanisme, University of Paris, and Institute for Housing and Urban Development Studies, Rotterdam, The Netherlands, has held key positions in a variety of public and private planning agencies as a consultant and specialist in Geographic Information Systems (G.I.S.) for major development projects in Panama such as Land Use and Traffic Study of the Port of Balboa; Development Plan for Sherman-San Lorenzo; La Cuenca Hidrográfica del Canal de Panamá: Posibilidades de un Desarrollo Sustentable (The Hydrographical Basin of the Panama Canal: Possibilities for Sustainable Development); Metodologías de Avalúo de los Terrenos Revertidos del Area del Canal (Methodologies for the Valuation of Reverted Land of the Area of the Canal); and Estudio Urbanístico y Demográfico del Area Metropolitana de Panamá (Urban and Demographic Study of the Metropolitan Region of Panama). Alvaro Uribe has also published La Ciudad Fragmentada (The Fragmented City), *an essay on urban development in Panama City (Panama City, CELA, Ediciones Formato Dieciséis, 1989), and a considerable number of papers and a study report on the subject of this paper and other related projects. He is a member of the World Society for Ekistics (WSE). The text that follows is a slightly edited and revised version of a paper presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001. It was kindly translated from the Spanish by Professor Lawrence D. Mann, also a member of the WSE and a participant at the Symposion.*

Introduction

Before the term "globalization" became popular, the Republic of Panama had converted in the emblem of its shield an inscription in Latin: "Pro Mundi Beneficio." This was no more than the recognition of the transit function that, due to its geographic position, the Isthmus had been playing since the beginning of the colonial period. Effectively, with the insertion of Panama into the international market, starting from the colonial "fairs" of Portobelo in the 17th century, its function as a way of passage kept pace with the successive transformation of colonial transit and of technology of inter-oceanic transport and telecommunications. This was clear with the construction of a railway across the Isthmus in 1850 (the time of the California gold rush). And, it was even clearer, later, with the construction of the Canal (1905) to finally generate a platform of international services. Starting in 1948, the creation of the Free Trade Zone at Colon, the granting of flag display rights (flags of convenience), the so-called "paper companies," issuance of insurance, up to the establishment of the international financial center (since 1970) added to this service platform. In this context, the construction of the Panama City-to-Colon autoroute (now in process) and the foreseeable widening of the Canal through a third set of locks that will permit ships of greater size to pass (now in study) are no more than the continuation of Panama's historic function of "transitism."

The (former) Canal Zone and the Panama Metropolis

A bit after the birth of the Republic (1903), there was installed on Panamanian territory an enclave known as the Canal Zone, a transverse band 16 km wide and 80 km long, centered on the axis of the Canal (fig. 1). This has conditioned since then the expansion of the two terminal cities: Panama City and Colon. This phenomenon, especially in Panama City, gave rise to a market process of speculation in urban land, by reducing drastically the availability of lands for expansion to a narrow band between the Zone and the Pacific Ocean (fig. 2). This land increased rapidly in price. This change produced an elongated city, starting from a center of great economic activity (services and employment), around which was located the whole of housing for high incomes. At the other extreme, there was produced a vast lineal periphery almost exclusively residential in character, of low density, along the principal arterial routes, where lived the population of medium and low incomes. Such a distribution of land uses generated a pattern of urban development with negative consequences for Panama City.

In the Central Area, this was manifested in a continuous search for greater densities of occupation, threatening the scarce architectural and urbanistic heritage and the very quality of life in this sector.[1]

On the periphery, large displacements resulted in higher costs and low quality of services such as solid waste collection

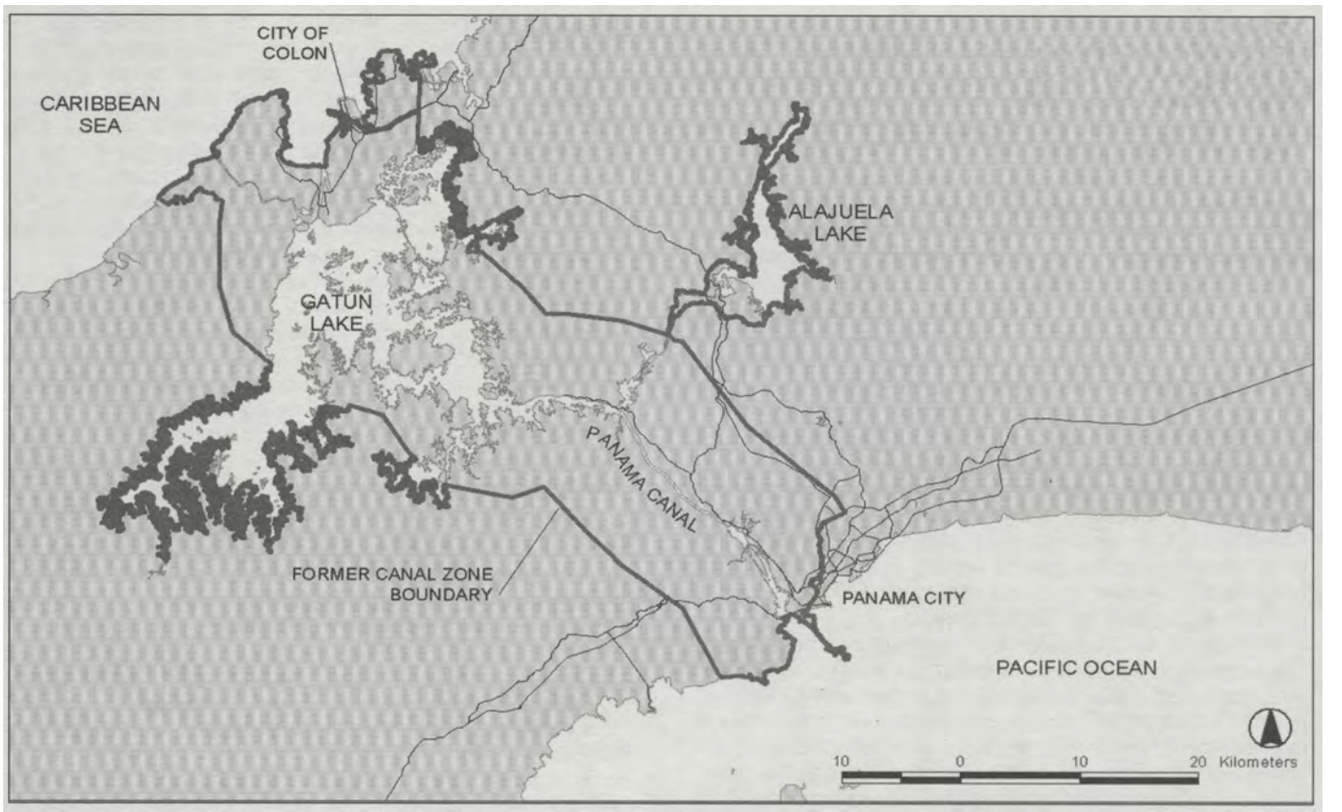

Fig. 1: Panama – Former Canal Zone and terminal cities.

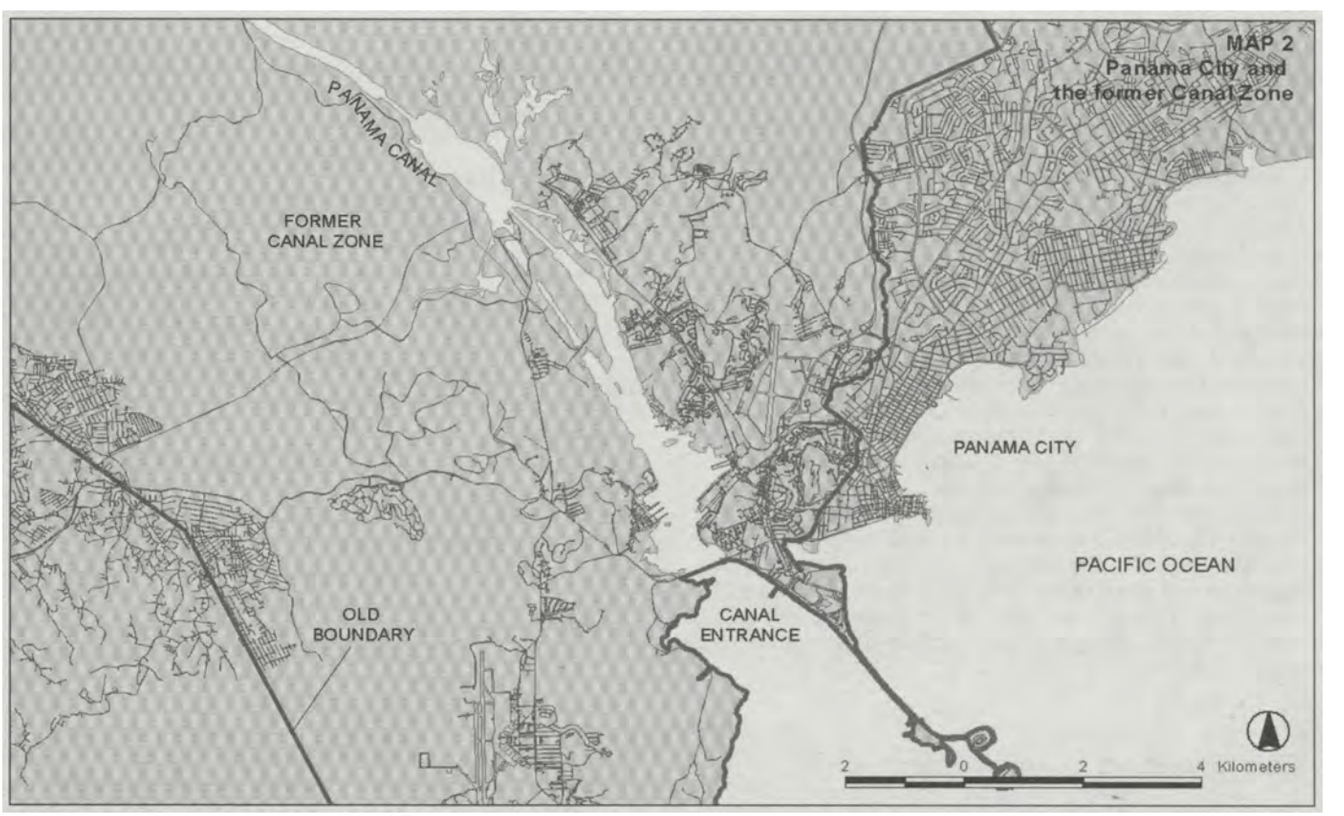

Fig. 2: Panama City and the former Canal Zone.

and transportation (time, distance, fuel, congestion) and in infrastructure (roads, water supply and sewerage). This had the effect of even further raising Central Area property values of lands located there. Effectively, investment in new construction in the Central Area surpasses half of the total private investment in Panama City.[2]

The contrast between this urban development style and that in the Canal could not have been greater, for urban complexes in the former Zone were modelled on completely opposite premises: residential clusters in the manner of neighborhood units, abundant open space, very low densities, were extended into the middle of these lands in natural state that served as separation barriers between these installations and Panama City. For this reason, while the image of the city represented congestion and narrowness, the Canal Area evoked abundance of land and amplitude of space. This divergence of urban development styles derived from two models applied for private property and the market, while the Canal Area was organized on State ownership and centralized planning. In this way, with the reversion of the lands of the former Panama Canal Zone, both local market actors and the Panamanian government found themselves literally in an unknown land, confronted by a vast urbanized space, produced outside the market mechanisms and State property.

The start of this new relationship, which was being transformed day-to-day, became inconvenient for everyone. This was because the real estate market (which was functioning more in mediation, or commercialization than in activities of development), had been operating in a situation whereby the scarcity of space created by the presence of the Zone, raised the prices and generated a demand focused in the lands of the Central Area. It observed with some fear the possible competition of a land-owning State that had a monopoly on the "new" areas and housing of central location. The Government, for its part, with no previous experience in the management of such abundant and valuable urban lands, and in a moment in which it had cut back its old functions of planner, limited itself, at first, to "sticking" the lands in the market, playing the role of an intermediary.

As the year 2000 approached – the time set for the culmination of the Treaties – the national government felt itself obliged to take a series of venturesome steps. These included the creation of an agency for administration of the reverted area, the Authority for the Inter-Oceanic Region (ARI) and the elaboration of land use plans, both for the Canal and for the Metropolitan Areas of Colon and Panama City (Metropolitan Plan). It was necessary to gradually incorporate the territory of the Canal Area into complete Panamanian jurisdiction from 1979 when the Torrijos-Carter Treaty took effect. This signalled the real opportunity to modify the existing development pattern, given the great quantity of available space, capable of absorbing the entire urban nucleus and its nearby areas. Moreover, the new area was of more value because it contained infrastructure, housing schools, ports and airports, etc., and was located directly adjacent to the Central Area of Panama City. Also this integration would make possible the establishment in the short term of a counter-tendency to urban dispersion and alleviate the congestion in which Panama City found itself. Finally, it was also an act of sovereignty, taking over and incorporating into national life a part of its territory long alienated from it.

The reverted areas

The background facts of earlier reversions, areas under North American jurisdiction outside the Canal Area – such as Punto Paitilla in Panama City or New Cristobal in the city of Colon – were on a scale so much lower that little valuable experience could be derived. Moreover, they resulted in complete privatizations. This treatment is not an option in the present circumstances, for it is fundamentally agreed that a considerable complex of lands and installations be reserved for the operation of the Canal, which is to remain public. In any case, even leaving aside the lands committed for Canal operations, the potential supply continues to be abundant, far beyond the capacity of the local land market to absorb it.

In the absence of plans that define the use of the reverted property, as they were given over to Panamanian jurisdiction, some minimum measures were established. These included the concession, rent or in minor cases sale of part of the reverted installations. This measure was considered necessary since they were dealing with complexes of buildings and isolated constructions built more than 50 years ago and whose maintenance in conditions of use would have been a charge that the Panamian government could not afford.[3]

These considerations made for two forms of intervention:

- The first is the creation of national parks, founded on a complex of principles, such as the need to preserve the woodlands that remain within the hydrological watershed of the Canal, the growing environmental conscience that is nourished by new scientific discoveries about the volumes of water and air that these woodlands can process, the economic possibilities (the touristic potential of these ecosystems), and finally the reaction to the negative experience that was occasioned by predatory practices related to livestock (deforestation, erosion, loss of soil, sedimentation of lakes, sand reduction in capacity for water supply, etc.).

- The second set of measures have to do with a series of concessions or assignments. The concessions are usually for periods of greater than 20 years and concern installations or lands of fixed utilization: ports, fuel tank complexes, railway, reforestation areas, etc. And the assignments, in the form of provisional custody, rent or lease, generally to public entities, concern installations such as airports, sanitary landfills, schools, etc., or lands for future development.

The plans

In 1993, an agreement for technical cooperation was finally signed with the Inter-American Development Bank and the Panamanian government, for the purpose of elaborating a Program of Studies for the Development of the Inter-Oceanic Region. This would be converted into three plans. After competitions, two of these were contracted with winning international consulting consortia by the Authority for the Inter-Oceanic Region (ARI). These were:

- the "Regional Plan";
- the "Land Use Plan," sometimes called "The General Plan"; and,
- the "Metropolitan Plan" which was contracted by the Panamanian Ministry of Housing.

The first two plans were delivered in June 1996, and the "Metropolitan Plan" was delivered in December 1997.

Obviously, at that point (only three or four years before the culmination of the Treaties), many decisions about the reverted territory had been made without the benefit of any of the plans. It could be said too that these decisions dealt with a general consensus or were so obvious that they did not require any such instrument either before or after deciding. These included matters such as protected areas, ports, housing, etc. With the competition for the Plans, nonetheless, three advantages were obtained:

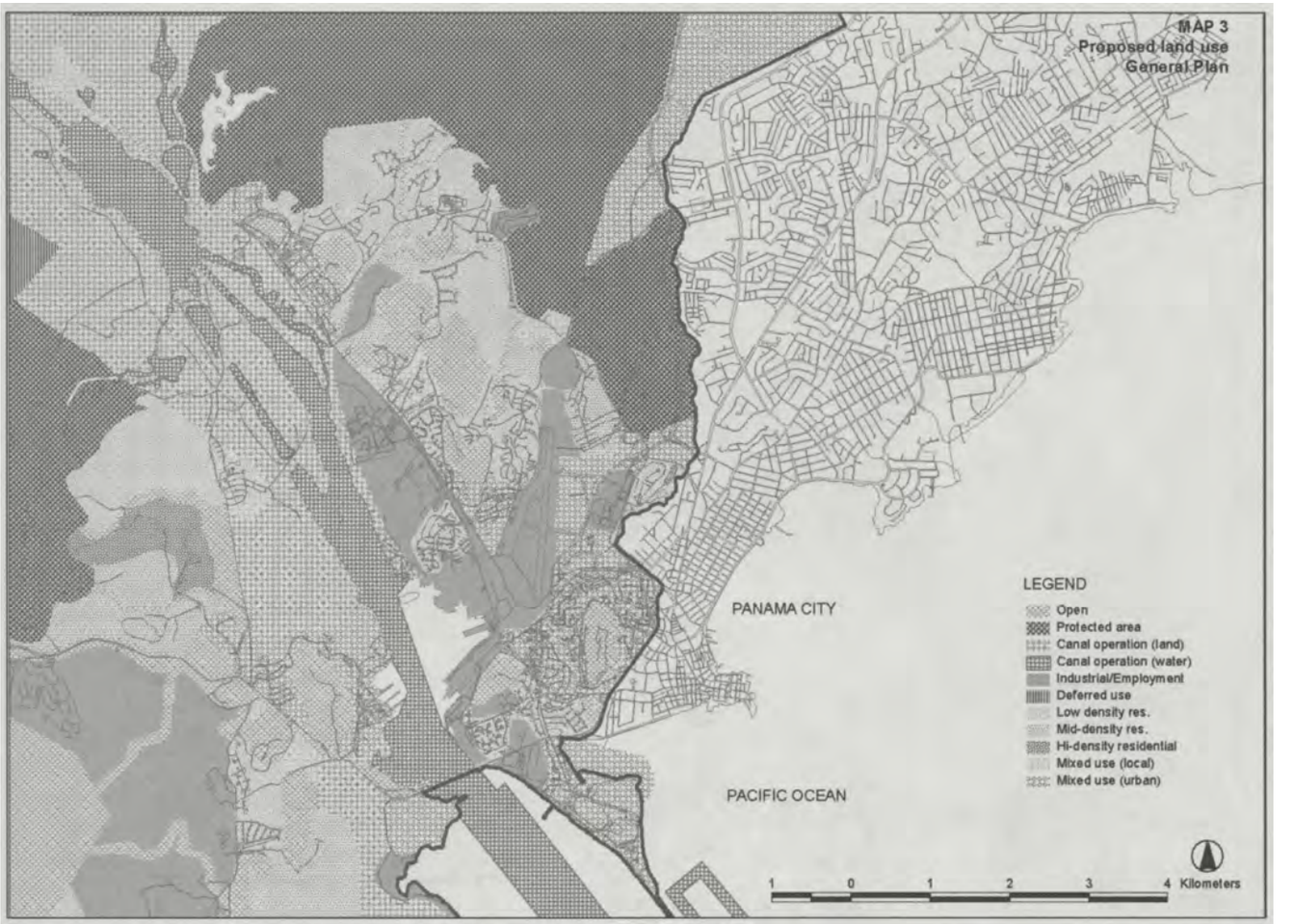

Fig. 3: Panama Canal Zone – Proposed land use, General Plan.

- an inventory of greater detail, with relation to lands, waters, and installations – especially in the Canal Area;
- a series of proposals on land use (General and Regional Plans); and,
- a selection of strategies for urban development (Metropolitan Plan) that enriched the state of knowledge and facilitated decision making.

The General or Land Use Plan

The scope of this Plan is the territory of the (former) Canal Zone – that is, the strip of land 16 km wide and 80 km long, plus the bodies of water of Lake Gatun and Lake Alajuela. (fig. 1). One of the objectives adopted by the Plan was "to incorporate the reverted areas and, by reverting them to the national economy, to stimulate a comprehensive development that will contribute to attaining a maximum of socio-economic welfare for present and future generations of Panamanians."[4] Despite this objective, the most concrete proposals included a regional (spatial) ordering and the establishment of a use-zoning proposed by the Canal Area. Through these the magnitude of the area adjacent to Panama City (the "Pacific-East Sector" in the Plans) was determined. This includes 5,776 hectares, of which 2,965 are recommended for urban uses (residential, mixed, employment offices, manufacturing), for protected forests, and for open space. Just 181 hectares are for Canal operations, and the remainder (2,630 hectares) is for protected woodlands and open space[5] (fig. 3). This represents an increase of some 1,000 hectares for urban purposes, beyond the 1,984 counted as existing urban uses. And some 1,000 hectares constitute the Plan's vision of development, and should remain "vacant," that is, without designated use.

The Regional Plan

The Regional Plan is more schematic and less detailed than the General or Land Use Plan. It includes, besides the former Canal Zone, the area defined by the hydrological watershed of the Canal, attaining a surface of 374,239 hectares. Of these, 328,645 are land and 45,594 are bodies of water (Lake Gatún and Lake Alajuela, mainly). The total area includes what is known officially as "the Inter-Oceanic Region," and this region is under the jurisdiction of the Authority for the Inter-Oceanic Region, or "ARI" (fig. 4). The inventory, in this case, was of the natural resources, and its objective was to propose a "plan of land uses of the region, under a perspective of economic benefit and conservation.[6] This means, in good measure, locating under a regimen of protection (woodland and forest) some 40 percent of the territory of the basin and recommending sustainable uses in the management of natural resources in general but especially water. Given that part of the hydrographic basin of the Canal includes the trans-systemic corridor be-

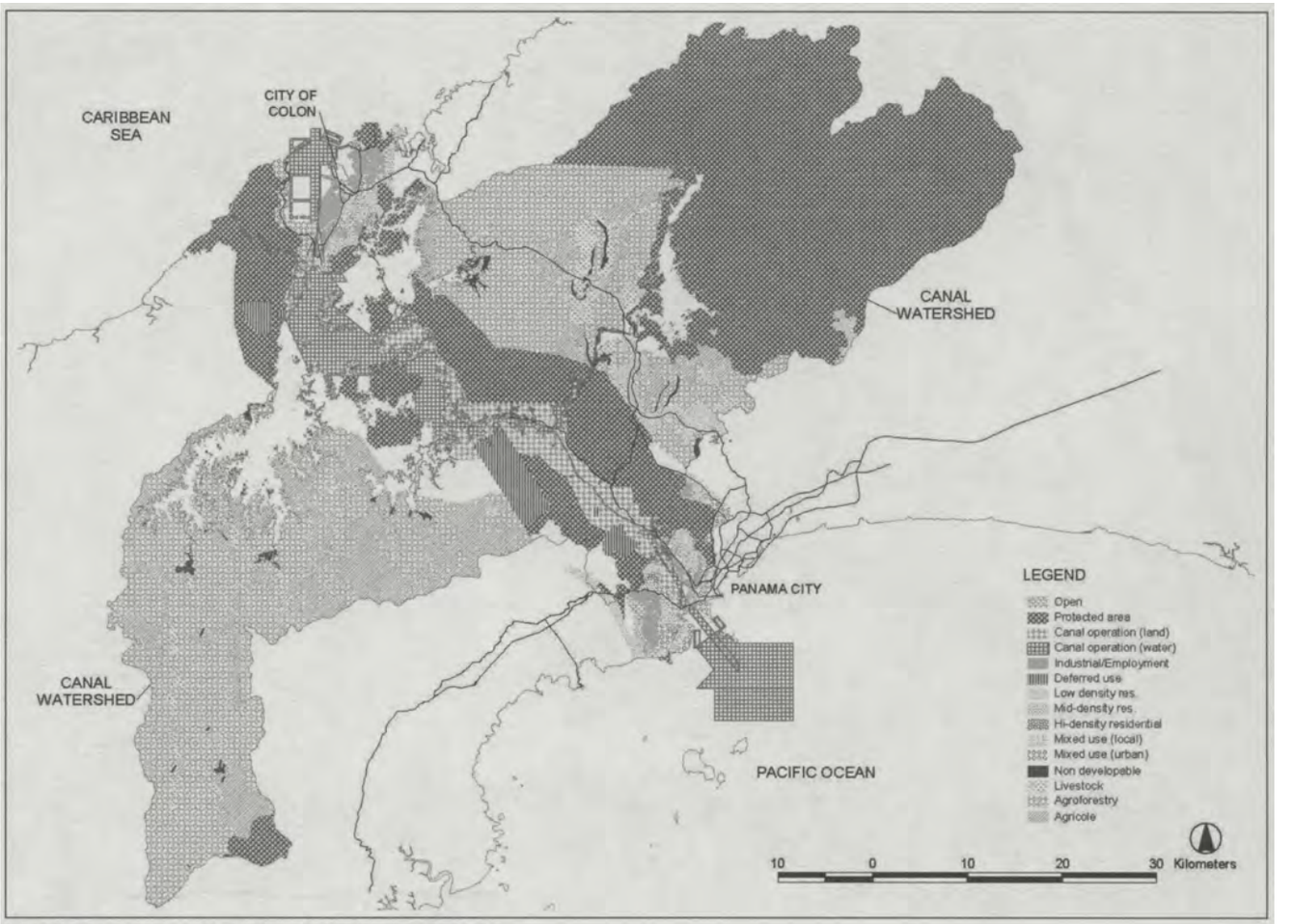

Fig. 4: Panama – Regional Plan (Inter-Oceanic Region).

tween Panama City and Colon (in territory that was always under Panamanian jurisdiction), the population[7] settlement along this way has always been a topic of preoccupation. This is because these lands tend to be considered as simply "vacant" areas, without better use than urbanization. Facing this, the Regional Plan identifies the natural and other constraints for urbanization in the area (and the rest of the Basin). Finally, for the rest of the reverted area, it adopts the urban uses proposed by the General (Land Use) Plan (fig. 4).

The Metropolitan Plan

This Plan for Urban Development, initiated by a different international consulting consortium at the end of those Plans just discussed, had among its goals the integration of the Canal Area to the metropolitan areas at the Pacific end (Panama City) and the Atlantic end (Colon), as well as assisting the Ministry of Housing "in improving the procedures for planning and control of urban development in the cities and areas of influence.[8] The territorial coverage of this Plan was of only 319,839 hectares, of which 46,225 hectares were lands occupied within the Canal Basin ("trans-systemic corridor") identified as "areas of special critical concern." To attain these objectives, the Metropolitan Plan identified three influential factors on development in the area of study:

- The action of market forces;
- Availability of high quality basic infrastructure; and,
- Quality of the physical and natural environment.

These factors were used to generate one scenario each. After some discussion, the third of these scenarios "Maximal Environmental Conservation" was selected as the most appropriate, following somewhat the patterns traced by the Regional Plan (seek, before anything else, the protection of natural resources, including those that supply the Canal operations).[9] This led to posing two goals "with critical spatial implications, both for the context and for the future form of the urban development":

- Containment, at the regional level, toward the end of restricting urban expansion, protecting the Basin, and taking advantage of existing infrastructure; and,
- Decentralization, specifically in the Panama City metropolis, to improve access to employment centers and services.[10]

Finally, four scenarios of decentralization were analyzed and evaluated:

- Satellite cities;
- Polarized development;
- Linear corridors; and,
- Multiple nuclei.

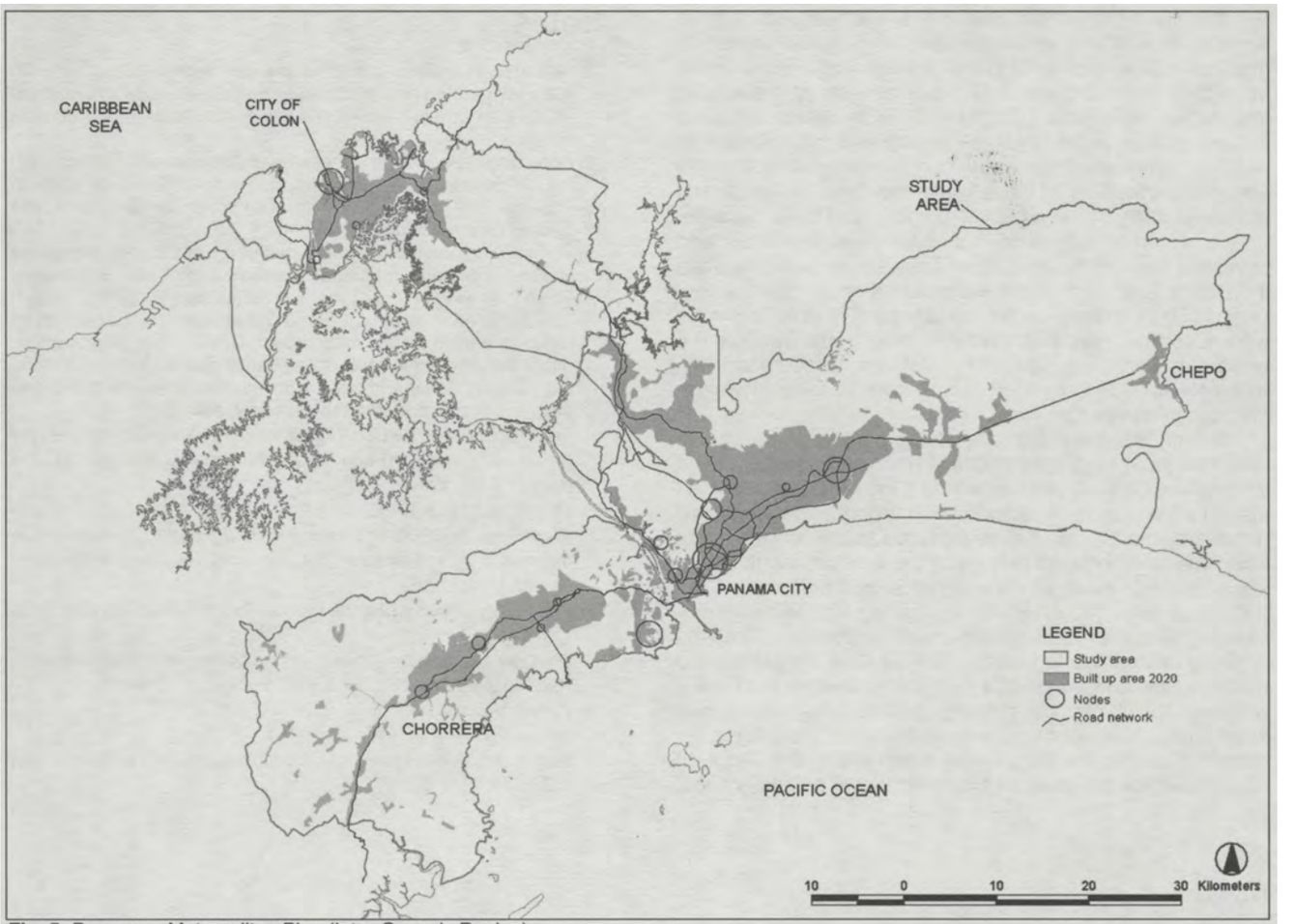

Fig. 5: Panama – Metropolitan Plan (Inter-Oceanic Region).

This analysis produced a proposal for development based on the establishment of urban service or employment nodes for the Panama City metropolis (fig. 5). The nature of this proposal made for a foreseeable net growth in the Region, requiring 10,000 additional hectares of newly developed land by the year 2020, of which about half would come from the reverted areas.

Conclusions

All the actions undertaken so far in relation to the Canal contain, implicitly, an idea of attempted development promotion. In the years that preceded and followed the signing of the Torrijos-Carter Treaty, the State played a central role. This was true both in the direct occupation of the areas to be reverted and in the direct operation of development (public corporations). During the first decade of the Treaties, in the 1980s, when the military government controlled everything without really doing anything, the prevailing vision (lacking more determinant interventions by authorities) was of environmental protection. This was a theme quite subject to discussion because of its implications for the function of the Canal (and implying the creation of national parks). Starting in the 1990s, with the creation of the Authority for the Inter-Oceanic Region and the elaboration of the General (Land Use), Regional, and Metropolitan Plans, all of the proposals limited public sector participation to regulation of a development promoted fundamentally by private agents (concessions of ports, railway, processing zones, etc.).

In the agenda of the local private sector, however, urban land has been considered as a monopolizable element, whose value is realized upon being **developed**, which is to say urbanized (in the sense of being provided with infrastructure). This perception derives from an old model of real estate speculation in the "cornering of urban lands as a form of investment of accumulated profits from commercial activities. . ."[11] This model was prevalent during the first half of the 20th century. Around it were mixed private interests and political power. This has produced a traditionally weak legislation related to property in land. It becomes manifest in facts such as:

- the flexibility of zoning norms (permitting almost anything to be done);
- the failure to update the urban property register, which dates from 1970; and,
- a 20-year exoneration from tax on real estate ("the parcel tax") for any new building.

These measures seem to benefit owners of vacant and unproductive lands.

In this favorable climate, some landowner-developers have gone to absurd extremes in implanting high densities in moderate-density residential neighborhoods. So extreme have been these projects that it was necessary to seek the intervention of Panama's Supreme Court to restrain the most flagrant abuses. Faced by these examples of what is made to pass for urban development, it can be understood why the abundant availability of lands within the Canal Area has not motivated daring, or even novel, proposals. This is because, on the one hand, the State has abandoned its role as land developer and, on the other, the private sector acts only when it owns the land. In fact, the two most important development projects by the private sector in Panama City in all its history were "Costa del Este" (300 hectares), and "Punta Pacífica" (65 hectares). They were initiated, respectively, in 1992 and 1999, when lands in the reverted areas were already in view – although in concession, not for sale.

The time when one could really acquire large parcels of urban lands at negligible prices is now lost in history. The lands of the Canal Area concentrate a value so high that their market price puts them outside the possibilities for cornering by private agents. This leaves the State as the only important landowner and, though it may be for the wrong reasons, acting again as land developer. Thus, from a civic perspective, the balance of these years, with the reversion of the territory complete in December 1999, must be seen as positive. The land is being used advantageously, little by little integrated into Panama City, and the greater part of the reverted land still is within the sphere of public property. It constitutes an important source of public income and an element of great force for urban planning of the two cities at either end of the Canal. It can be said that the reverted area is no longer an empty good.

Notes

1. See a recent decision of the Panamanian Supreme Court, wherein were suspended zoning changes that obtained densities much above the norm in medium and low density residential neighborhoods.
2. According to data of the Directorate for Statistics and Census, during the decade 1990-1999, private investment in construction in Panama City was $1.753 million, of which $0.924 was in the Central Area (that is 52.7 percent).
3. The only important exception is that of the lands and installations tied to the present and future operation of the Canal, which were given over to Panama at the end of the regime of the Treaties. This included a great part of the Canal Area (the Canal and its banks, the hydrological watershed). This complex of properties, under the jurisdiction of a public agency created for the purpose, the Panama Canal Authority, is maintained in the realm of public property, or else subject to strict use regulation.
4. See *Plan General de Uso, Conservación y Desarrollo del Area del Canal,* vol. II, pp. II-1 (Panama City, Authority for the Inter-Oceanic Region (ARI), 1996).
5. *Op. cit.*, vol. IV, p. IV-58.
6. *Plan Regional Para el Desarrollo de la Región Interoceánica, Informe II,* p. 1 (Panama City, Authority for the Inter-Oceanic Region (ARI), 1996).
7. Population settled along the corridor is 120,000 in the May 2000 *Census.*
8. *Plan de Desarrollo Urbano de las Areas Metropolitanas del Pacífico y del Atlántico,* vol. I, p. R-1.
9. *Op. cit.* Vol. II, p. 5-4.
10. *Ibid.*, p. 6-1.
11. See Alvaro Uribe, *Panamá: Ciudad Fragmentada* (Panama City, CELA, 1989), p. 33.

A future for Athens

Alexander Papageorgiou-Venetas

The author, an architect and town planner, graduated from the Faculty of Architecture of the Athens Technical University, specialized in town planning in Paris, and obtained his Ph.D in urban design at the Technical University of West Berlin. After a ten-year period of practicing architecture in Athens where he conducted several studies for the Greek Tourism Organization (hotels), the Archaeological Service of Greece (landscaping of excavation areas) and private clients, he has been working mainly in Germany (Berlin and Munich) as well as in Greece as an urban designer in a wide scope of activities, including teaching, research and a planning consultancy. His special interest focuses on urban conservation, planning and urban history. He has worked with the Freie Planungsgruppe Berlin and the Burckhard Planconsult/Basel. He has elaborated major planning development and preservation schemes for the Greek state (Chios Tourist Development, Mykonos-Delos Development Plan, Chania Old Town Preservation Scheme) and acted as an expert for UNESCO (1970, Iran) and the UNCHS (1982, Yugoslavia). As an advisor to the Greek Minister of Culture (1974-1977) he coordinated the Greek participation in the U.N. Vancouver Conference on Human Settlements (1976) and in the European Architectural Heritage Year (1975). He has also acted as the liaison officer between the National Greek Committee and the UNESCO experts for the Acropolis conservation campaign. He has taught as a visiting professor in Berlin (1969-1970), Stuttgart (1981-1982) and Munich (1996-1997) and was for 10 years (1976-1985) Professor of Urban History at the Post-Graduate Center "Raymond Lemaire" for the Conservation of the Architectural and Urban Heritage in Bruges and Louvain/Belgium. He has elaborated major research studies on European planning history and planning issues of his native town Athens, and is considered an authority on the town planning history of modern Athens. His seminal publications include: Continuity and Change/Preservation in City Planning *(New York, Praeger, 1970);* Delos/Etudes Urbaines sur une Ville Antique *(Munich, Deutscher Kunstverlag, 1981);* Stadtplanung. Entwicklungslinien 1945-1980 *(Tübingen, Wasmuth, 1984);* Hauptstadt Athen, ein Stadtgedanke des Klassizismus *(Munich, Deutscher Kunstverlag, 1994);* Athens, The Ancient Heritage and the Historic Cityscape in a Modern Metropolis *(Athens, Archaeological Society of Athens, 1994). Professor Papageorgiou-Venetas is a member of the World Society for Ekistics (WSE). The text that follows is a revised and expanded version of a statement made by him at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.*

Introduction

Here are some thoughts on the future of Athens, the capital of Greece, sketching a desirable and even probable perspective of its future development. I attempt to explain why I do not believe contemporary Athens allows us to harbor radical visions and why we should just cultivate what I would describe as a modestly hopeful outlook.

Visions, especially of a town planning nature, have been in the past the product of particular social and historical conditions and circumstances. Thus:

- Early social reformers like Campanella and Thomas Morus, as well as advocates of social planning utopias in the 19th century such as Godin, Fourier and, recently, Le Corbusier, were responsible for a number of unprecedented and intellectually stimulating visions which never materialized and can more plausibly be described as intimations of a desirable future state of affairs rather than images from an inventory of feasible possibilities.
- Resoluteness coupled with extensive political power always provided a rather solid prerequisite for the design and execution of the seemingly impossible. Such is the case of Peter the Great who, in the 18th century, during the time of the so-called "enlightened autocracy," was seized by a vision of Russia's new capital in the form of a city on the Baltic swampland, a location which was to secure the country's opening to the west. The founding of St. Petersburg nevertheless represents the imposition of a vision by force at great cost to common sense and financial prudence.
- The effects of natural disasters upon cities, such as earthquakes and fires, very often led to regeneration as a means of affirming historical continuity. These conditions may at the same time form the basis for a radical reorganization and revitalization of the urban fabric: thus the planning of Thessaloniki in 1917 represents a unique urban vision in contemporary Greece which to a certain extent came to fruition. Here, once again, we see a vision being transformed into reality through the collective will and the expediency of breathing life into the urban wasteland of the great fire.

Contemporary Athens

Contemporary Athens is a totally different story. Some features contribute to the uniqueness of the circumstances that make up the Athenian setting, and do not permit the elaboration of visions:

- the existence of a pluralistic society allowing for a variety of conflicting interests which acts as a bulwark against the imposition of paternalistic or authoritarian solutions;
- a trend towards an immediately gratifying consumerism accompanied by a preference for directly accessible gains; in this context, proposals in favor of long-term planning are likely to fall on deaf ears;
- the absence so far of major natural disasters which could have led to comprehensive changes (although overpopulation and its consequences for the city are potentially disastrous).

And yet we continue to speak in terms of visions for Athens

Fig. 1: Athens downtown in 1937: Panepistimiou (University) Avenue and the classicist "trilogy" of the National Library, the University and the Academy, acting as a cultural forum for the capital.

despite the absence of conditions which are conducive to any radical urban regeneration. But more must be said on this point:

- a number of well-meaning but rather naïve architects still indulge in radical concepts, apparently not realizing that transforming a metropolis is unlike changing the façade of a building;
- more or less charismatic political figures often express their belief in large-scale infrastructure works which will extricate Athens from the grip of its present calamities; such measures as the underground, the Stavros-Eleusis urban highway and the new airport undeniably belong to this category but may only draw attention to the difference between visions and functionally necessary projects;
- few town planners have been bold enough to propose the creation of a new administrative center for Athens outside the historical nucleus, George Candilis and C.A. Doxiadis being the last ones to do so 40 years ago. Here we do have "vision" but of the utopian variety, since it is unthinkable to abandon the existing historical nucleus of a metropolitan area as long as the latter survives.

In recent times town planners in Greece have been rather more reserved with their "visions," opting for what is known as *Detached Incrementalism,* i.e. preference for localized step-by-step interventions.

I would like at this point to focus on the notion of "gradual incremental improvements" which is implicit in the concept of *Detached Incrementalism.*

I begin by asking the following question: Assuming that visions of any kind are part and parcel of different social and historical preconditions than those prevailing in Athens today and given the traumatic experiences of past decades, what after all can Athenians justifiably believe in?

The answer lies in the direction of a gradual and circumspect process of improvement through changes affecting primarily our attitudes, as opposed to interventions related to physical planning. The culturally detrimental results of the increase by twelve-fold of the income per capita in Greece within a single generation (a startling increase, even by Japanese standards, in the level of material wealth) are well known. This form of growth is inversely proportional to the quality of life in the metropolis. What *does* need to be examined however is whether this has led to a corresponding improvement in the course of action and the attitudes that the majority of the urban population is prepared to adopt. I consider this to be intrinsically connected to the issue of whether there can be reasonable ground for hope, although I do not believe that we have, at this point, the willingness to switch to qualitatively sounder ways of living. Nevertheless, we have recently come to realize that it is not large-scale projects that lead to improvements in urban life but a shift in the choice of our priorities and objectives.

Evolution trends and signs of hope

In recent decades the town of Athens has been subjected to an almost uncontrollable building frenzy – euphemistically called "development" – which, surprisingly enough, did leave a number of distinctive features of the Athens Basin intact. These features, which were either fortuitously or instinctively preserved, make it possible to outline a number of rather optimistic perspectives in relation to a more harmonious life in the city. Thus:

- The building that has taken place within the Athens region has not caused irreparable damage. Construction has mostly

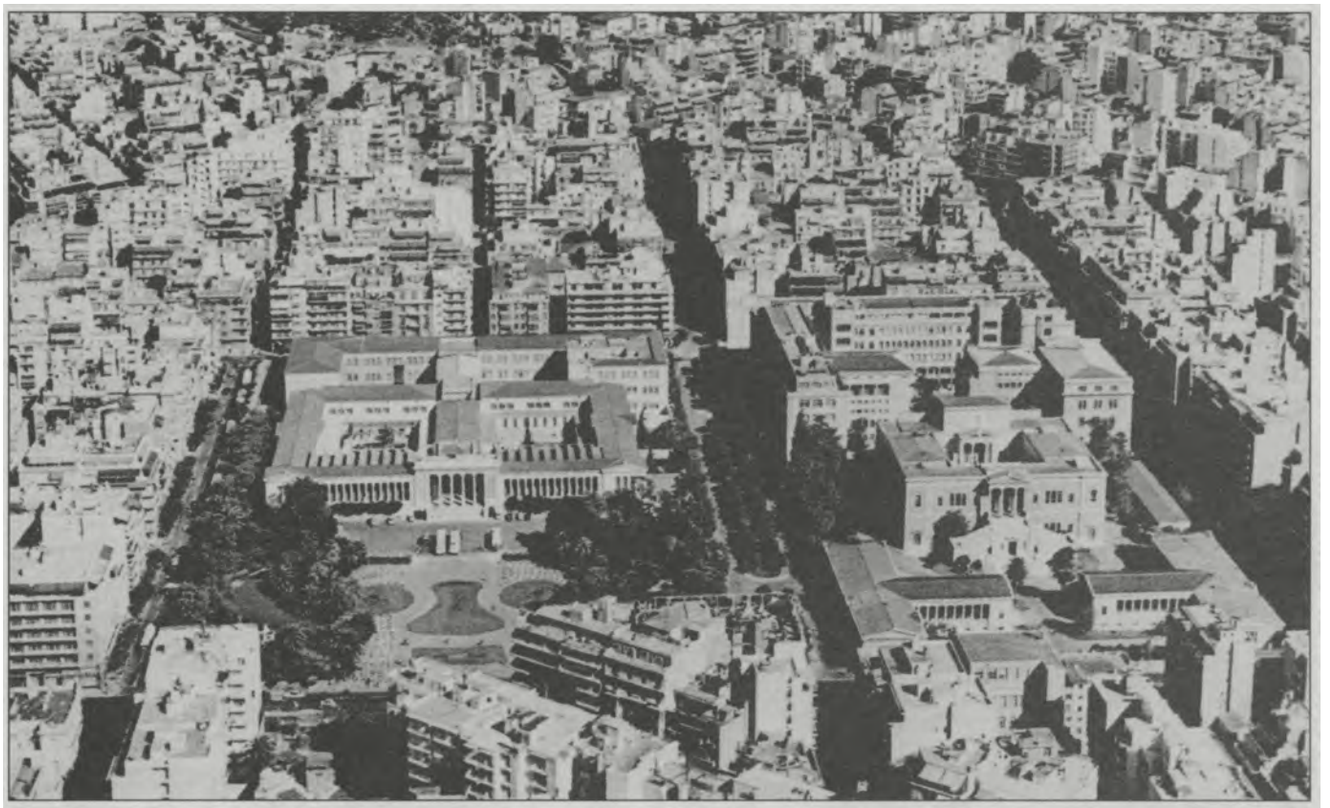

Fig. 2: The dense urban fabric of downtown Athens. In the center, on the left the National Museum and on the right the complex of the Polytechneion (Technical University).

occurred at the periphery of the metropolitan area and luckily enough projects such as the high-rise buildings of the Phaleron seafront and the out-of-scale cathedral (a Greek Sacré-Coeur!) that was to be built on the Tourkovounia hills never materialized. A relatively inoffensive architectural scale with areas of uniform building heights prevails. Important landmarks such as the Ilissos river or the Phaleron coast have already been sacrificed in the name of some self-annulling notion of progress. However, the first attempts to repair the gaping quarries following their closure are encouraging signs of what may follow.

In general terms: the growth of this gargantuan city has not obscured the harmonious skyline which can still be seen from the Saronic Gulf and the hills within the Athens basin. In anticipation of the sense of bafflement that a discourse on skylines may cause, I would like to qualify the above by saying that the readability of the cityscape is an existential imperative of the utmost priority.

• The configuration of hills – planted and bare ones alike – represents a construction-free zone within the basin. This is a double advantage,

– firstly in that it creates an articulation of the otherwise extremely dense mass of built space; and,
– secondly in that it allows an overview of the whole of the metropolitan area from interesting vantage points.

These hills, in combination with parks, cemeteries, alleys of trees along the central axes and the reafforested slopes of the surrounding mountains, are crucial elements of a future green belt system in a city with a grim environmental record. This mosaic of green areas is the result of the praiseworthy work of some inspired individuals over the past century. It is my belief

Fig. 3: A few high-rise buildings on the periphery of the inner city which are in sharp contrast with the uniform, 5-8 storey-high, built volume of Athens.

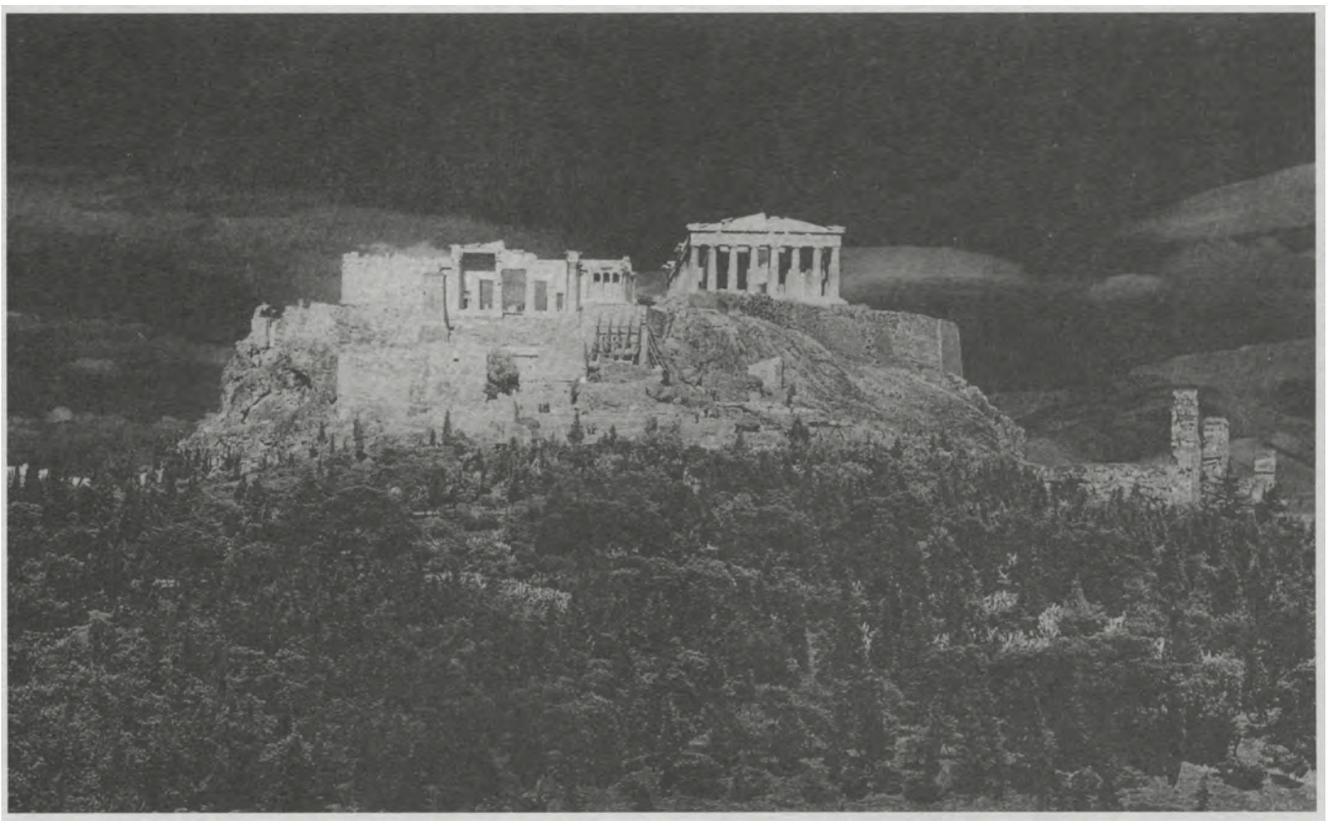

Fig. 4: A dramatic frontal view of the Acropolis from the west.

Fig. 5: The broadest avenue of the capital: Vassilissis Sophias (Queen Sophia) Avenue next to the old royal palace (today's Parliament) and the National Gardens.

Fig. 6: Aerial view of the Acropolis, the Ancient Agora excavations, the Olympeion and the Plaka, Athens old town.

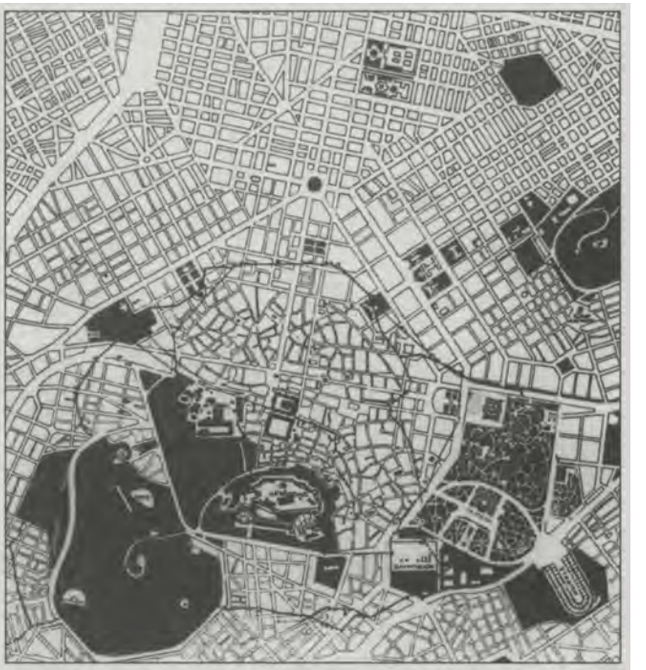

Fig. 7: Athens city center – In black: area of public parks and reafforested hills.

that it should be preserved and developed as an essential part of the city's structure.

• Building within the city has created an extremely dense fabric of built volumes up to 10 stories high. This manifests itself both in the floor-area ratio of up to 7 (!) and in the extreme concentration of inhabitants (up to 1,000 persons per hectare). Needless to say, the implications of this in terms of the quality of life within the city are disastrous. Nevertheless, there is some compensation in the form of the prevalent style of architecture and the overall urban image whose dense configuration luckily does not contain any disproportionate morphological extravaganza. Historical landmarks such as neoclassical public buildings and numerous archaeological sites are surrounded by a bland and innocuous architecture of white cubical forms. Things could have been much worse! Athens was spared the architectural randomness of multiple forms, colors and materials which make up the dubious modernism on the outskirts of cities such as Madrid and Rome. Planting of trees, diligent maintenance of façades and making the most out of the numerous narrow internal courtyards represent ways in which the potential, inherent in the city's development over the past four decades, can be emphasized. This would be consistent with an initiative that has emerged over the past 10 to 15 years concerning the reorganization and the improvement of urban public space, as well as the preservation of buildings of historical significance. This spontaneous reaction represents, at the same time, an expression of a collective sense of dissatisfaction on the part of Athenians who have come to realize that this type of resoluteness may be the only available means of halting a continuous process of urban decay.

• From a functional point of view, a trend leading to an hierarchical development of sub-centers in the overall metropolitan area is under way. Its aim is to alleviate the historical center through the creation of a polycentric network of secondary nuclei. This is a challenge that so far no master plan – of which we have seen four in recent decades – has managed to meet. The first phase of this development has been particularly demanding in terms of expenses and effort coordination on the part of the state, which has supplied social and technical infrastructure works in the approximately 60 municipalities within the greater Athens area. Market forces, the desire to conserve the particular identity of suburban municipalities and, of course, Greek business acumen subsequently led to the creation of local markets and community centers within the periphery of the basin. This transformation of the amorphous urban body into a multi-centered metropolitan area has a clear affinity to chief planner Prokopis Vasiliadis' proposal in 1972 for the creation of "cities within the city."

• There is lastly the historical heritage of Athens to be taken into account, the symbolically laden topography of archaeological sites, the focal points created by the Acropolis, the Olympeion and the reconstructed Stadium, as well as the vernacular nucleus of the old city, the "Plaka," on the northern slope of the Acropolis. The cultural identity of Athens, which places it in the league of cities such as Rome and Constantinople, is apparent in the unmistakable aura which the city possesses. It is a feature which many central European cities have systematically tried to emphasize in connection with their cultural heritage and which has been bequeathed to Athens with its beneficial effect in recent history of bringing about the re-emergence of the city as the capital of the Hellenes.

Discussion concerning this notion of cultural identity has in recent years been shallow and ineffectual. It has included a rather nebulous intention to "unify" archaeological sites, parks, historical monuments and reafforested hills for the purpose of creating a "Cultural Park," an idea which is put forward with considerable persistence and in ignorance of the fact that it is anything but new. This vision – the term is appropriate here – which consisted in the idea of a park-like historical space at the heart of the city around the Acropolis, was inherent in the inspired work of those responsible for the first city plan in 1832 (the architects Stamatios Kleanthis and Eduard Schaubert, both pupils of K.F. Schinkel), only to be lost in a quagmire of uncontrollable profiteering. The idea was then revived, with slight

Fig. 8: The rebuilt (1951-1955) ancient portico of Attalus in the Agora.

Fig. 9: The eastern part of the inner city's green belt: Olympeion, Stadium, Zappeion and National Gardens.

Fig. 10: Map of the urban pattern (built/unbuilt areas) of the Athens municipality area – In the center the Acropolis and on its northern slope the old city of Plaka and the classicist expansion of the city in the 19th century.

variations, on three occasions in the 20th century: by Thomas Mawson in 1919, by Constantine Biris in 1946 and by the Alexander Fotiadis group in 1980.

The main idea behind the creation of a Cultural Park is to display the architectural heritage whilst enabling Athenians and visitors alike to familiarize themselves with the lattice of parks, archaeological sites and older parts of the city. This combination of aims is, in principle, plausible. Its implementation does however come across a number of obstacles compared to which problems having to do with town planning (underground pedestrian passages, expropriation, issues pertaining to the formation of parks) are the least difficult to solve. The main issues such as the accessibility of archaeological sites and recreational areas to visitors are connected to the need to

Fig. 11: The Plaka and the Acropolis from the northeast – In the background Phaleron Bay.

protect these sites – which total 350 hectares – as well as to a need to ensure that the conditions for a personal and contemplative approach to the monuments remain compatible with the presence of a large number of visitors. The eminent Greek architect Dimitris Pikionis has spoken convincingly and memorably on all these issues. It is clear that facile and populist proposals, such as the "opening" of all archaeological sites, from the Roman Agora to the theater of Dionysos on a 24-hour basis to an often disrespectful public, cannot even be thought of as a solution to the problem.

The creation of the Cultural Park does indeed represent an objective, albeit one that will be attained only through a corresponding, possibly time-consuming process of modifying people's attitudes and sensitivities as urban dwellers. The past 150 years have seen the emergence of the necessary conditions for such a unified archaeological site through random initiatives rather than through a planned process. It is necessary for institutions and official bodies to avoid vacuous and ineffectual promises as they carry out their concerted work. This aim, possibly the only one that comes as close to being a vision, cannot be attained within 5 or 10 years but only through assiduous and inspired work over a longer period of time.

Conclusion

I have pointed out a number of conducive conditions and trends, hopeful signs of an inherently self-controlled pattern of

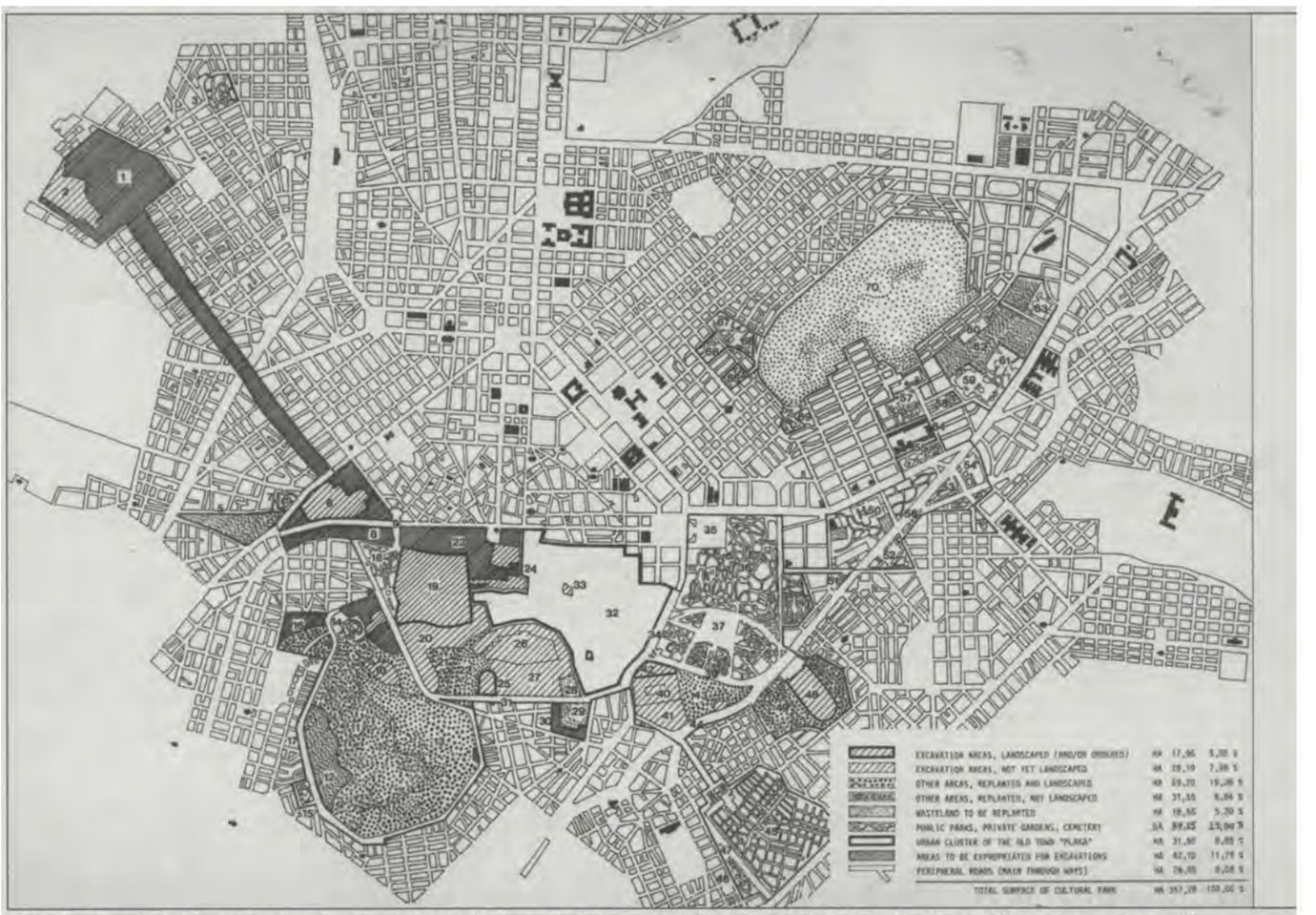

Fig. 14: The area of the cultural-archaeological part of Athens (in the process of gradual realization) – Treatment of the various areas with regard to landscaping and/or urban design.

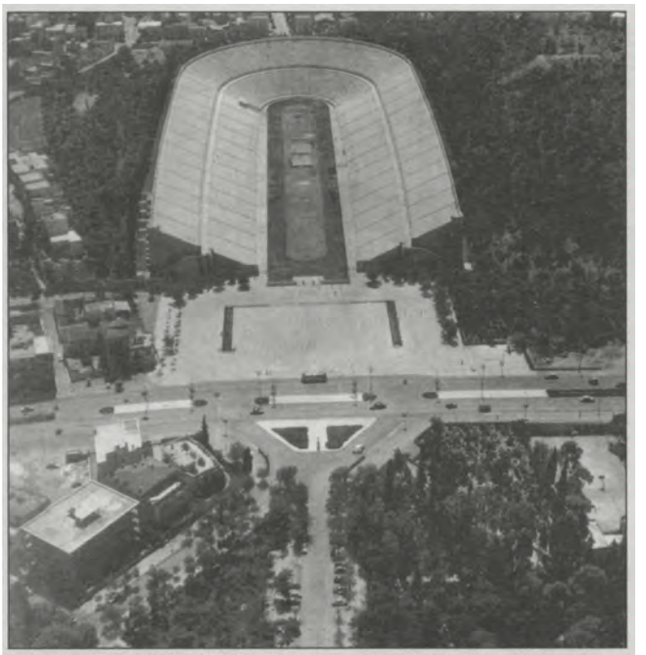

Fig. 12: The rebuilt (1896-1902) Panathenaic Stadium of Herodes Atticus.

Fig. 13: The Zappeion exhibition hall and the nearby National Gardens.

The twelve sectors of the cultural-historic area – Denomination and extent by item in ha

Sector 1: Kolonos Hippios, Academy area, Dipylon-Academy road; Areas 1-4	
1. Areas to be expropriated	23.70 ha
2. Archaeological excavations	4.00 ha
3. Kolonos Grove	1.90 ha
4. Kolonos Hippios-Academy road	0.60 ha
Total	30.20 ha
Sector 2: Kerameikos excavations and vicinity; Areas 5-9	
5. Area of the former gas plant	3.75 ha
6. Kerameikos excavations area	3.50 ha
7. Small park on Peiraios St.	0.90 ha
8. Areas to be expropriated	6.00 ha
9. Main roads	2.40 ha
Total	16.55 ha
Sector 3: Hill of the Nymphs, Pnyx hill and Mouseion hill; Areas 10-17	
10. Ancient monuments and sites	1.60 ha
11. Planted, not landscaped area	22.60 ha
12. Not planted area	5.00 ha
13. Planted and landscaped area	18.40 ha
14. Hill of the Nymphs	1.60 ha
15. Small park in the Petralona district	0.70 ha
16. Areas to be expropriated	4.40 ha
17. Main roads	5.20 ha
Total	59.50 ha
Sector 4: Agora excavations, the Roman Agora, the Areopagus, the Acropolis with upper slopes; Areas 18-31	
18. Theseion park	2.70 ha
19. Agora excavations	9.00 ha
20. Areopagus and the Areopagus-Pnyx valley	5.50 ha
21. Acropolis west slope, western section	1.70 ha
22. Acropolis west slope, eastern section	2.80 ha
23. Monastiraki area to be expropriated	7.00 ha
24. Roman agora and Library of Hadrian	2.00 ha
25. Odeion of Herodes Atticus with approach	0.90 ha
26. Acropolis, plateau	3.00 ha
27. Acropolis upper slopes	7.00 ha
28. Odeion of Pericles area	0.75 ha
29. Makriyanni lot	1.25 ha
30. Makriyanni lot expropriation area	1.00 ha
31. Main roads	3.75 ha
Total	48.35 ha
Sector 5: Plaka, the old town of Athens; Araas 32-34	
32. The old town	31.60 ha
33. Small excavation areas	0.40 ha
34. Peripheral roads	2.00 ha
Total	34.00 ha
Sector 6: National Garden, Zappeion Gardens, Prasidential Mansion; Areas 35-39	
35. Parliament Building (formerly Royal Palace)	2.70 ha
36. National Garden (formerly Royal Garden)	16.20 ha
37. Zappeion Gardens	11.40 ha
Section 6 (cont'd)	
38. Presidential Mansion (formerly the New Palace) and garden	2.20 ha
39. Main roads	4.20 ha
Total	36.70 ha
Sector 7: Olympeion area with the Ilissos river banks; Areas 40-44	
40. Olympeion	2.40 ha
41. Excavation area S. of the Olympeion	2.20 ha
42. Excavation area N. of the Olympeion	1.00 ha
43. Athletic installations	3.70 ha
44. Peripheral roads	2.00 ha
Total	11.30 ha
Sector 8: The First Cemetery of Athens; Areas 45-47	
45. The First Cemetery	18.00 ha
46. Small park	1.40 ha
47. Main roads	2.20 ha
Total	21.60 ha
Sector 9: Ardettos hill and the ancient Stadium; Areas 48-49	
48. The ancient Stadium	3.50 ha
49. Ardettos hill and Northeastern hill	6.50 ha
Total	10.00 ha
Sector 10: The Athens Cultural Complex; Areas 50-56	
50. Cultural Center, so-called	8.70 ha
51. Truman Memorial Grove	0.20 ha
52. National Research Center	1.50 ha
53. National Gallery and nearby planted area	2.20 ha
54. Hilton area	1.40 ha
55. Evangelismos Hospital park	1.00 ha
56. Main roads	5.30 ha
Total	20.30 ha
Sector 11: Lycabettus lower east slope; Areas 57-64	
57. American School of Classical Studies, British School of Archaeology at Athens, Gennadius Library and their gardens	3.30 ha
58. Petraki Monastery with garden	1.00 ha
59. Army Hospital and garden	2.40 ha
60. Navy Hospital and garden	1.00 ha
61. Venizelos Grove	1.80 ha
62. Concert Hall and vicinity	7.80 ha
63. American Embassy and garden	1.10 ha
64. Main roads	1.20 ha
Total	19.60 ha
Sector 12: Lycabettus, the replanted areas; Areas 65-70	
65. Schisti Petra Rock Garden	0.75 ha
66. French School at Athens	0.80 ha
67. Pefkakia Grove	1.30 ha
68. Pikionis School	1.00 ha
69. Dexameni Reservoir and planted area	0.85 ha
70. Lycabettus, main replanted area	44.30 ha
Total	49.00 ha
Total surface of the cultural-historic area	**357.10 ha**

Fig. 14 (cont'd).

development of the metropolitan area of Athens despite all the technical inadequacies and the mediocrity of planning initiatives so far.

I believe that if these tendencies are strengthened and maintained we may see a slow but steady improvement in the quality of life within the metropolitan area. This is a hope we can harbor whilst keeping an eye on the task of bringing about gradual improvements. One of the necessary conditions here is familiarization with both the historical and the physical setting of the 60,000 hectare Athens basin, two thirds of which constitute the built-up area. Younger people, in particular, seem unable to appreciate the unique historical and topographical character of the area, as well as the way in which these are exemplified in the region's intrinsic nature, absorbed as they are in the "here and now" creed of indifference to the wider context. This too is one of the things that must change.

One must therefore be suspicious of the "visions" leitmotiv! But if I must conclude with a vision, a personal vision about Athens, I would like to do so by saying that it is one according to which the population within the Athens basin has decreased by one million people – both feasible and possible within the next 100 years by means of decentralization – and involves the kind of daily activity that one sees nowadays during the month of August. In such comforting future circumstances, I believe that we will be able to speak not only of visions but also of miracles!

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Symposion: Defining Success of the City in the 21st Century

Part 6: Networks

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***No written record exists of any statement made during the sessions.**

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The oil-based technology and economy: Prospects for the future

Klaus Illum

Dr Illum, with degrees in Civil Engineering from the Technical University of Denmark and in Energy Systems and Energy Planning from Aalborg University, has had his own consulting company, ECO Consult, since 2000. He was from 1962 for over a decade mainly occupied with the development of educational programs in computer science alongside with studies in systems theory and cybernetics at the Danish Academy of Engineering in Copenhagen and Aalborg. Thereafter, as senior Associate Professor (Docent) at the Department of Development and Planning, Aalborg University, he was mainly engaged in the development of methods and computer models for the technological, environmental and economic analysis of alternative scenarios for the development of energy systems and agricultural production systems. He has also been engaged in studies of environmental policies and problems in Central and Eastern European countries, in particular in energy planning in Czechoslovakia/the Czech Republic, and was Programme Manager for the Nordic Training Programme for Energy Experts in the Baltic States, the PROCEED programme. In addition, Dr Illum has developed comprehensive computer models for: numerical analysis of thermodynamic systems (power plants, cogeneration plants, integrated industrial processes, etc.); energy planning on the national, regional and local energy system level; technological/socio-economic energy systems analysis; economic assessment of alternative energy system projects; flow analysis (nutrients and energy) and economic analysis of agricultural systems. He has developed the Sustainable Energy Systems Analysis Model (SESAM), an advanced, general computer model for the analysis of scenarios for the future development of national, regional or local energy systems which has been used and is presently being used for the integrated technological, environmental, and economic analysis of present and future energy systems infrastructures in Denmark, the Czech Republic, Poland, and Germany. He has been engaged as a consultant for Danish regional energy planning authorities in a number of projects and has been responsible for several publicly financed projects in Denmark and other European countries. He received the Statoil Reward 1987 for the development of the design and analysis of LOcal Cogeneration Utility Systems (LOCUS-systems). He is also a member of the World Society for Ekistics (WSE). The text that follows is a slightly edited version of a paper originally intended to be presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001, in which the author was, unexpectedly, prevented from taking part.

Introduction

This paper outlines the technological and economic characteristics of a singular era in the history of the Earth where cheap oil has given affluence to a minority of its population, namely those who have the technology and capital to exploit the oil reserves developed in the second half of the 20th century.

The world economy's technological infrastructures are in all respects based on abundant supplies of cheap, so-called conventional oil.[1] Therefore, for the stability of the world economy it is of decisive importance to avoid an unforeseen gap between demand for and supply of cheap conventional oil. If demand continues to grow, such a gap may occur long before the world's oil resources are used up.

The question is not whether or not the world is running out of oil. The question is for how long an increasing demand for cheap, conventional oil can in practice be met under the actual circumstances regarding the world endowment of oil reserves, the amounts already used, present and future discovery trends, the recovery techniques made available, and the predominant economic and geo-political regimes, which control investment and production policies in the different regions.

As shown by the demand and production scenario displayed in figure 1, it is likely that continued growth in demand and production for another 10-20 years will result in a sudden and steep decline in the supply of cheap, conventional oil.

Demand growth means that the functioning of cities, intercity and international transport, agricultural production and many industries becomes increasingly dependent on oil-based technologies. Thus, the more motorways, parking lots and airports are built, the more oil-powered vehicles and aircraft are fed into the traffic veins, and the more agricultural production world-wide becomes dependent on oil-powered machinery, the quicker we reach the point where most of all these oil-engines suddenly come to their final standstill – without any alternative technologies ready to replace them.

On the other hand, demand reduction before the oil-engines come to a standstill implies that many of these engines are replaced by other technologies even though oil is still in abundant supply at low costs. If the affluent societies within the next decades accomplish a technological transition away from oil-engines, oil will remain in abundant supply at low costs for a long time – to the benefit of poor, developing countries, which need more time for the transition.

Moreover, the mitigation of unfortunate changes in the global climate requires a substantial reduction in fossil fuel consumption. Therefore, although non-conventional oil from tar sands and oil shale is available – at higher prices – in abundant amounts, these resources should only to a limited extent replace conventional oil.

In this situation there are no business-as-usual solutions. Radical technological transformations of our energy supply and demand infrastructures are needed. Apparently, few architects and urban planners have considered the full consequences that this transformation will have for the future development of our cities.

The cheap oil era

The second half of the 20th century bears no resemblance to any earlier period in the history of the Earth. Never before did its population grow from two to six billion. 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 man have the power to exhaust the fish stocks in the seas and to change the climate.

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 for the heating of buildings, and petrol and diesel for the millions of internal combustion engines in cars, trucks, buses, aeroplanes, tractors, ferries, cargo ships and fishing boats. Had oil not been found in abundant amounts in the 1950s and 1960s, the basic infrastructures of the industrialized societies – the physical structures and transportation networks of the cities, the industrial production networks, the mechanized agricultural production, etc. – would not have been as they are today. Also, the migration of millions of people from rural areas to the megapolises in the Third World was conditioned by oil for the transportation of food and other basic necessities to these huge, overcrowded habitats.

Although there are, naturally, limits to growth on a finite planet, the predominant economic growth theories of this singular historic era are based on the axiom that economic growth will not be constrained by limitations in the supply of the fossil fuel resources upon which the economy is based, in particular the supply of oil. It is recognized that continued growth in the global oil demand will result in accelerated depletion of conventional oil reserves. But economists assume that the market will ensure the smooth transition to non-conventional resources (oil sands and oil shale, conversion of natural gas (gas-to-liquids)) and other chemical energy carriers (natural gas, hydrogen) without major unfortunate consequences either for the affluent or for the poor societies. Thus, in its *World Energy Outlook 1998* the International Energy Agency (IEA) does "not foresee any shortage of liquid fuels before 2020, as reserves of non-conventional oil are ample, should the production of conventional oil turn down."

However, considering the fact that our present economy in all respects depends on the physical power and mobility provided by petrol and diesel engines and that hundreds of millions of people have no immediate alternative to oil for heating their houses, it is hazardous to rely on the validity of an axiom for which there is no empirical evidence. In this singular historic period of transition from growth to decline in conventional oil reserves, the particular geological, economic, demographic and political circumstances which determine the supply of liquid fuels must be scrutinized (fig. 1).

In its *World Energy Outlook 2002* the IEA forecasts an increase in oil demand from 26 billion barrels in 2000 to 44 billion barrels in 2030, of which only 8 percent will be covered by non-conventional oil. This means that the global economy becomes increasingly dependent on continued supplies of cheap, conventional oil – while at the same time the reserves of this cheap, conventional oil are depleted at such a rate that a steep decline in production is likely to occur if not years before, then shortly after 2030. Under these circumstances it is questionable whether liquid fuel production from non-conventional sources can be brought on-stream quickly enough to make up for the decline in conventional oil production.

The graphs show the results of an oil depletion scenario computation for

– a global endowment of conventional reserves of 1900 Gb (Gigabarrels = billion barrels) of which about 900 Gb had been produced by the year 2000 and about 150 Gb are yet to be found,

– a production of non-conventional oil and natural gas liquids (NGL) of 475 Gb from 2000 to 2030, and

– a demand growth of 1.6 percent per year until 2030.

Although the production of conventional oil from existing reserves in most regions is declining, the decline in total production is offset by production from new conventional reserves and increased production of non-conventional oil and NGL.

This scenario is possible but catastrophic: The demand is covered until 2020 but then a sudden steep decline in the production occurs. To avoid such a development, demand must be reduced.

The results are not very sensitive to changes in the assumptions made. A 20 percent increase in conventional oil reserves postpones the sharp peak by less than five years.

Fig. 1: Oil demand and production, 2000-2075.

Regarding demography, wealth distribution and oil demand, the IEA assumes that a global economy in which the inequalities between the affluent minority and the poor majority are perpetuated can be sustained. Today the 1.1 billion people living in the affluent OECD countries consume 16 billion barrels of oil per year whereas the 4.9 billion living in poorer countries

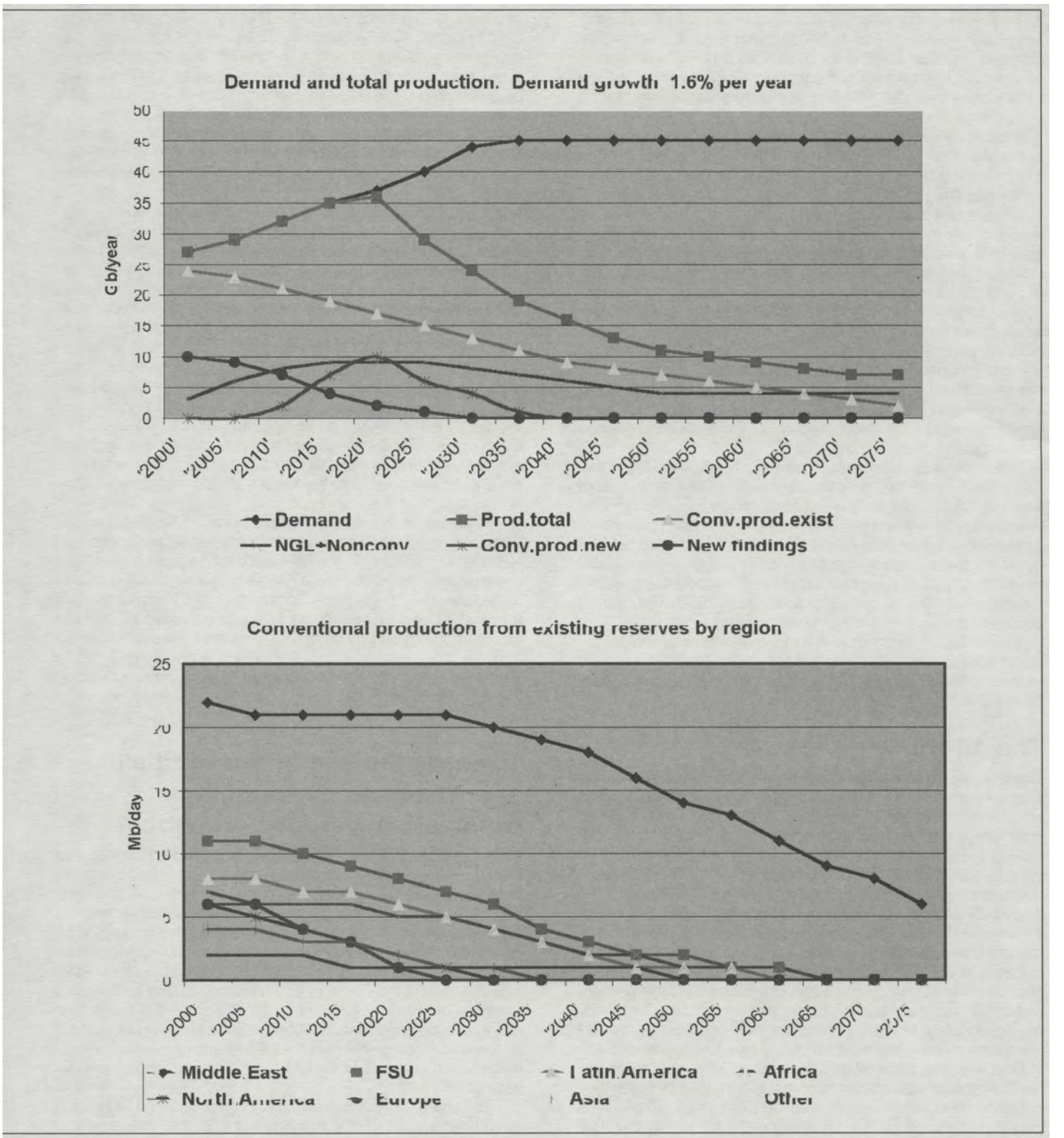

Fig. 1 (cont'd).

consume 10 billion barrels. In other words, the per capita consumption is 7 times higher in the OECD countries than in the rest of the world. In the IEA scenario, this ratio will be only modestly reduced in the coming decades, the average per capita consumption being 5.7 times higher in the OECD countries than in the rest of the world by 2030.

Thus, as long as oil consumption is an indicator of material wealth, the assertion that there will be no oil shortage in the next decades implies that poor peoples remain poor. Should, for instance, the economy of China continue to grow so that the Chinese per capita demand for oil grows to just 50 percent of the OECD level by 2030, instead of the 17 percent assumed

in the IEA scenario, then the additional demand in this country alone would amount to 9 billion barrels or a 20 percent increase in global demand by 2030. This is unlikely to happen unless China gains absolute control over the Middle East oilfields. Otherwise the growth in demand will result in higher oil prices which will in turn reduce growth.

Another fundamental issue concerning the global economy is climate change. The rationale of the Kyoto Agreement on greenhouse gas reductions is to reduce the risks of economic calamities caused by climate change. Therefore, the aim of the agreement is to initiate the transition to technologies which do not or to a much lesser extent depend on fossil fuels. However, if oil consumption continues to grow, CO_2 emission reductions required to prevent climate change cannot be achieved, in particular because the CO_2 emission per barrel of non-conventional oil is significantly higher than the emission per barrel of conventional oil. Consequently, unless they are prepared to reduce their oil consumption, the Kyoto signatories are engaging their countries in a futile, expensive exercise. On the other hand, if they do reduce their oil consumption, the lower demand may keep the price of oil relatively low for a longer period of time. Thus significant CO_2 reductions may be attained at low or zero costs.

These immediate reflections on the depletion and replacement of oil, on global policies concerning the distribution of material wealth, and on the economic costs of environmental deterioration reveal the complexities, contradictions and inconsistencies encountered in the process of technological and economic transition from the short era of cheap oil into a future where the physical power provided by oil will be too expensive – because of the oil prices and because of environmental costs – to compete with other power sources.

In order to comprehend in full the implications of this transition process, some further reflections on the technological and economic characteristics of the system to be transformed may be in place.

The oil-world

Technologies and natural resources are complementary. Coal was needed to fuel the steam engine and the steam engine was needed to mine and transport coal. Coal and the steam engine replaced watermills, windmills, horse-drawn coaches, sailing ships and human labor, thus creating the industrial infrastructures which in turn enabled man to develop the technologies needed to exploit another natural resource: oil. Yet, had easily accessible, cheap oil not become available from the oil wells in Pennsylvania and Texas in the late 19th century, the internal combustion engine would not within a couple of decades have been developed to propel the cars, trucks, ships and aeroplanes, which are basic constituents of the present oil-based societies' technological infrastructure. As it happened, cheap oil and the internal combustion engine gave rise to an ever growing demand for cheap oil and engines.

The oil-engine technologies themselves were needed to find and develop new oil fields which ensured that the demand they created was covered by abundant supplies of cheap oil. Also they were needed to find and develop natural gas fields. The world-wide oil prospecting, the drilling, the pumping, and the transport of oil and gas from the wells could not have taken place without the oil-engines which propelled the aeroplanes, helicopters, the on-site equipment, the trucks, and the cranes for the laying of pipelines. Also, the construction of huge dam walls for hydropower stations in remote areas could not have been accomplished without oil-engines. Moreover, without oil-engine propelled aeroplanes the first nuclear bombs would have remained destructive only to those who made them, and without the production of nuclear warheads the development of a nuclear power industry would hardly have been economically feasible. Coal still covers 25 percent of the world's primary energy supply – chiefly for electric power generation – but without oil it could not be so easily mined and transported. It should also be recalled that in many towns in the U.S. and Europe the first electric power stations were oil-powered.

Thus, the transition to oil had many more technological ramifications than the transition to coal which preceded it and laid the grounds for it. Ample power from oil-engines, which start at the push of a button, has become available at any place at any time at very low costs. It is Prometheus unbound.

World War II was the first great war in which the mobility of troops, armory and bombs was provided almost entirely by the oil-fueled internal combustion engine: in trucks, jeeps, armored cars, tanks, warships and, most prominently, the fighter and bomber planes. However, while suffering from the attacks by oil-driven war machines Europe's civilians were able to survive without oil. Agriculture was still predominantly horse-powered and the supply of food did not depend on long-distance transportation of feedstock and agricultural products. Today, half a century later, the situation is different. Without oil the entire economy would immediately come to a standstill. Even a modest reduction in supply would make the economies of the rich countries tremble and a substantial increase in the price of oil will have a heavy impact on the economies in the rich as well as in the poor countries.

The transition to the coal-steam engine era made life easier for those who enjoyed the goods of industrial production and travelled comfortably in the railway coaches and on board the steamships. However, life became less easy for those who mined the coal, those who shovelled it into the furnaces, and those who carried it on their backs into the stores. With oil it is all different. It flows by itself – or assisted by pressure generated by oil-engines – from the wells through pipelines to refineries or tankers which, propelled by oil-engines, transport it to any destination. It is easily distributed and easily stored. It is readily available as petrol, diesel and fuel-oil everywhere.

Towards the end of the windfall energy economy – empirical pragmatism versus cornucopia

At the beginning of the 19th century no one could foresee that the coal-based industrialization was to bring about the technologies needed to utilize the then unknown oil resources. And in the second half of the century, when the Diesel and the Otto engine was invented, no one knew how much oil could be found to run these engines. It could have been much less than the approximately 1.7 trillion barrels found so far. And this planet's total endowment of conventional oil and natural gas liquids could have been much in excess of the 2.3 trillion barrels which it seems likely to obtain at relatively low costs. As it is, the world's conventional oil endowment is a windfall energy asset which is hastily being used without much concern about its finality.

Because of low recovery costs, conventional oil resources have been depleted at a much faster rate than necessary to provide the goods and services obtained. Had the oil price been substantially higher, more energy efficient technologies would have been developed and less wasteful, local production would have had competitive advantages against goods produced far away. Cars would have run more kilometers per liter and buildings would have been designed to sustain a comfortable indoor climate at lower oil or gas expense; railways would have been modernized instead of closed down; energy saving recycling would have played a bigger role in industries; and less feedstock and food would have travelled thousands

of miles before being consumed.

Thus, in the short era of cheap oil all the techniques and technological infrastructures upon which the functioning of present societies is based have been designed so as to balance investment and maintenance costs against low costs of oil consumption. When oil prices rise, this balance shifts in favor of other techniques and infrastructures, meaning that not just some but practically all techniques and infrastructures must be renewed and restructured. The question is whether this transition will take place smoothly as oil prices rise slowly, allowing the market economy to accommodate to the new conditions. Or whether more abrupt oil price upswings will cause a self-perpetuating economic recession which inhibits technological renewal and restructuring.

The literature on oil resources, reserves and depletion is divided into two, sharply contrasted but hitherto unnamed schools of forecasting:

- those belonging to the one school could be called *the historical pragmatists*;
- those belonging to the other *the theoretical resource economists.*

● Historical pragmatists claim that no economic theory can give a credible answer to questions about oil depletion, simply because there is no empirical evidence upon which the assessment of the validity of economic theorems concerning this singular era in the history of economic development can be based. Therefore, attempts to answer questions about the depletion of conventional oil must be based on specific analyses of the actual circumstances, based on the best available data on conventional oil reserves; present and potential future production capacities in the different oil provinces; and alternative demand forecasts, resulting from different assumptions as to future technological, social and economic development. The geophysicist and social development analyst M. King Hubbert (1903-1989), who in the 1950s predicted that conventional oil production in the U.S. would peak in the mid-1970s – a prediction which turned out to be correct – is one of the most prominent representatives of this line of thought.

In 1976 Dr Hubbert concluded his paper "Exponential growth as a transient phenomenon in human history"[2] with the following observations:

> *"It appears therefore that one of the foremost problems confronting humanity today is how to make the transition from the precarious state that we are now in to this optimum future state by a least catastrophic progression. Our principal impediments at present are neither lack of energy or material resources nor of essential physical and biological knowledge. Our principal constraints are cultural. During the last two centuries we have known nothing but exponential growth and in parallel we have evolved what amounts to an exponential-growth culture, a culture so heavily dependent upon the continuance of exponential growth for its stability that it is incapable of reckoning with problems of non-growth.*
>
> *Since the problems confronting us are not intrinsically insoluble, it behooves us, while there is yet time, to begin a serious examination of the nature of our cultural constraints and of the cultural adjustments necessary to permit us to deal effectively with the problems rapidly arising. Provided this can be done before unmanageable crises arise, there is promise that we could be on the threshold of achieving one of the greatest intellectual and cultural advances in human history."*

Twelve years later, in 1988, Dr Hubbert said in an interview:

> *"Our window of opportunity is slowly closing ... at the same time, it probably requires a spiral of adversity. In other words, things have to get worse before they can get better. The most important thing is to get a clear picture of the situation we're in, and the outlook for the future – exhaustion of oil and gas, that kind of thing – and an appraisal of where we are and what the time scale is. And the time scale is not centuries, it is decades."*

Since then exponential growth has now continued for another 15 years and the world economy has year by year become more and more dependent on oil and natural gas. At the same time, prominent oil and gas geologists have presented quite a *"clear picture of the situation we're in"* and assessed *"what the time scale is."* On the basis of increasingly detailed mappings of the Earth's geological formations and meticulous recordings of the findings of new oil and gas fields and the development in reserves, they have recorded the history of the exploration and discovery of oil and gas reserves and the subsequent depletion of these reserves. Naturally, these recordings do not provide accurate data on the development in reserves and production – the ultimate yield from any particular oil field can only be assessed to a certain degree of accuracy and in many cases production potential forecasts depend on assumptions regarding future investments in oil rigs, recovery techniques, pipelines, refineries, etc. However, they constitute the only empirical evidence for the appraisal of the prospects for the future.

● The theoretical resource economists, with Morris A. Adelman as a prominent representative, repudiate the depletion warnings issued by the historical pragmatists, which they refer to as Neo-Malthusian pessimism. Peter J. McCabe of the U.S. Geological Survey presents a distinction between what he finds to be unwarranted "empty-barrel-pessimism" and cornucopia,[3] the core argument against the pessimistic outlook being that reserves are not fixed but determined by *"the mix of knowledge, technology and investment that sustains the process of exploration and production sufficiently to meet short- and medium-term demand expectations. Reserves depend on the interaction of this process, government policies and, finally, the price people are willing to pay for oil products. Since we cannot know future technology or prices, we cannot quantify future reserves. This should not be a concern, since it is these processes that are important. Ultimately, as Adelman commented, 'oil resources are unknown, unknowable and unimportant'."*[4]

The technological development aspect of this theory is expressed in the frequently cited saying that "the stone age did not end because of lack of stones. Likewise, the oil age will not end because of lack of oil." History shows that technologies come and go. As conventional oil becomes too expensive or more convenient fuels and technologies become available, it will be replaced by non-conventional oil, other liquid fuels, electric power or whatever new technologies may turn up.

However, few would miss the difference between on the one hand the shift, taking place over hundreds of years, from axes and spearheads made of stone to the more effective ones made out of bronze, and, on the other, the transition to be accomplished over a few decades of an eight billion people world economy based on cheap-oil technologies to an economy based on other, not yet developed technologies.

Yet, the Stone Age may offer an analogy to modern times. Flint stone well suited for tool-making was mined from underground veins. As the miners did not know the extension of the veins of relatively easily mined, good quality flint stone, one could imagine that they kept producing the stones at low costs in increasing quantities until one day they suddenly, without warning, came to the end of the veins. Unprepared, because no price increases had signalled that the growth in the cheap-flint-stone economy was coming to an end, the tribe faced a

sudden economic recession as it took time and big investments to open other, less easily accessible veins. Likewise, cheap conventional oil may cover a rising demand for another decade or two before a sudden decline in production occurs. As Peter J. McCabe states: *"... in the long run the supply of fossil fuel is finite, and prices inevitably will rise unless alternate energy sources substitute for fossil energy supplies; however, there appears to be little reason to suspect that long-term price trends will rise significantly over the next few decades."*[3] The question is whether under these circumstances the transition to an economy based on other technologies and fuels will begin early enough to be accomplished smoothly.

The future for the city

Can the city change so as to accommodate its functions to a future where oil and natural gas is expensive and in short supply and the consumption of non-conventional oil and coal is strictly rationed in order to mitigate the greenhouse effect? Not a hundred years but 20 or 30 years from now. Or will it deteriorate with heaps of rusting cars around it?

Buildings have been designed to sustain a comfortable indoor climate by means of heating and/or cooling systems driven by cheap fossil fuels. When these fuels become expensive and in short supply, how will a comfortable indoor climate be sustained? The vehicles in the streets and on the parking lots are powered by oil-engines. What will replace them? Food and goods are transported to the city on trucks powered by oil-engines. What other means of transport will replace the trucks?

There are no simple answers to these questions. Fuel cells converting hydrogen to electric power can replace the oil-engine but the hydrogen must be produced on the basis of renewable energy sources or nuclear power. Thus hydrogen production for vehicles, aeroplanes, ships and agricultural machinery will compete with buildings and industries for electric power from renewable energy sources and nuclear power plants.

Even if the nuclear power industry is revived – a revival likely to be opposed in many countries – it will take several decades and be very costly to build enough nuclear power stations to replace a substantial amount of the present fossil fuel consumption. To build renewable energy installations with such capacities that they can replace a substantial part of the present fossil fuel consumption will be economic madness, partly because of the storage and regulation systems required in a system where continually fluctuating inputs from solar installations and windmills play a major role.

Therefore, end-use energy consumption – in buildings, vehicles, industries, etc. – which is presently covered by fossil fuels cannot be covered by renewable energy sources and, if accepted, nuclear power. End-use consumption must be greatly reduced.

To reconstruct the city, built in the period where end-use energy consumption was no major concern, so that it can function at greatly reduced end-use energy consumption is an enormous challenge to architects, urban planners, engineers, economists, and – not least – the city's inhabitants and their politicians.

To postpone the initiation of the reconstruction is to neglect not only the foreseeable shortage in the supply of cheap conventional oil but also the probable consequences of the greenhouse effect. The consequence is likely to be deterioration and impoverishment of the urban environment.

Notes

1. The notion "conventional oil" has been introduced by oil economists and oil geologists to denote crude oil which at low costs can be extracted from onshore wells and offshore wells at moderate depths, as distinct from oil from deepwater wells (at ocean depths more than 500 meters), oil extracted from tar sands, oil shale, etc.
2. Presented before the World Wildlife Fund, Fourth International Congress, "The Fragile Earth," San Francisco, 1976.
3. Peter J. McCabe, "Energy resources – Cornucopia or empty barrel?" *AAPG Bulletin,* vol. 82, no.11 (November 1998).
4. John Mitchell et al., *The New Economy of Oil. Impacts on Business, Geopolitics and Society* (London, Earthscan, 2001), pp. 46-47.

Groundwater in relation to fractured till

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Introduction

Prior to the 19th century, groundwater was regarded as a part of the ground. In legal terms, groundwater was a part of the solus upon which the fee rested, being an integral part of the title to land. But with the beginning of the 19th century, economic demands upon groundwater forced a change in Anglo-American legal institutions. When something becomes worth litigating, it becomes worthy of its own definition. Initially in this process, the law was faced with a lack of physical scientific knowledge, causing judges to label groundwater "occult" (FRAZIER v. BROWN, 1861).

Groundwater science, however, did not stand still. In the 20th century, the work of such geologists as Oscar Meinzer and Harold Thomas provided lawyers access to that knowledge, initially for lawyers in administrative agencies and then for all lawyers through court decisions. Admittedly, there remained "the wide range of conditions of occurrence of ground water [that] reflect the great variations in porosity and permeability of the solid components of the earth's 'Crust'" (THOMAS, 1955), but lawyers and judges came to believe that they could make decisions in assurance of "the dramatic increase in the scientific knowledge of the nature and movement of groundwater" (NOTE, 1986). A modern court can confidently purport to define groundwater and describe its operation below ground. No vague references to the "occult" are needed, as exemplified by a more recent Ohio legal decision (VILLAGE OF PLEASANT CITY V. DIV. OF RECLAMATION, ODNR, 1993):

> Water from rain and snow infiltrates the soil and percolates down, filling pores and cracks in rocks and other materials beneath the surface of the earth. Depending on the hydraulic gradient and the rock material's permeability, the ground-water moves more or less slowly through these underground materials towards points of discharge, such as lakes or pumping wells. The permeable rock materials that the ground-water travels through are known as aquifers.

Is this wrong generally? No, but recent till fracture studies (FAUSEY et al., 2000; ALLRED, 2000) have indicated that the facts in a wide range of instances will not accord with the description in the above case. The purpose of this paper is to describe the current status of land-use decision making in Ohio as it relates to physical limitations imposed by the presence of fractures and joints in glacial tills. The paper also proposes science-based decision-making tools to protect groundwater in fractured settings.

Until recently, even among the majority of the scientific community, the presence and significance of fractured unlithified materials (especially tills) has not been well understood. Fractures in such materials have been documented in the geologic and soils literature for at least three decades. George White (1982) summed up decades of observations in northeast Ohio:

> The structure of weathered tills also differs from till to till, and the variety of fracture patterns is significant ... The variation in structure is an important factor for movement of fluids through till. Intergranular permeability is very low, but fluids may travel through the joints. This factor must be taken into account in testing for permeability of potential septic-tank and waste-disposal sites. (p. 29)

Although this document has been widely circulated in Ohio, little attention had been paid until recently to Dr White's cautions. While this lack of recognition has the appearance of negligence on the part of the environmental community, it must be remembered that at the point in time that White was working in Ohio, the environmental community was just in its infancy. Earth Day began in 1970, the U.S. Environmental Protection Agency (USEPA) was founded in 1970, and Ohio's version (OEPA) began in 1972. While there was carry-over from past work of other agencies, most experts in the responsible agencies had been engineers, who are not commonly familiar

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with the glacial geomorphology and soils literature in Ohio. Even ten years later, at the final White 1982 publication date, the Ohio agencies which had the combined responsibility for the protection of Ohio's waters were not staffed by individuals who had been extensively trained in glacial geomorphology and soils. Still today, they are not.

Groundwater vulnerability assessment screening tools

Given finite resources, groundwater protection efforts should focus on those aquifers most susceptible to contamination and/or most essential for sustained water supplies. Existing tools for assessing groundwater vulnerability or delineating protection zones include DRASTIC (ALLER et al., 1987), the Well Head Protection Program, USEPA Sole Source Aquifer designation, Source Water Protection (SWAP), regional water protection programs, and methods that involve map overlays (e.g., Federal Emergency Management Agency maps, wetlands maps) and/or GIS thematic coverages.

The modern version of DRASTIC provides a standardized method for quantifying and comparing the relative vulnerability of different areas to groundwater contamination. This method has been adopted by ODNR Division of Water, and many maps of groundwater vulnerability have been developed by that agency on a county by county basis. These maps were produced by combining seven input variables: depth to water, recharge, aquifer media, soil media, topographic slope, vadose zone media, and hydraulic conductivity. In preparing these maps, ODNR made certain adjustments in the original DRASTIC structure, especially in the input variable concerning the vadose zone media. The weighting of this variable is adjusted depending on increasing knowledge about the character of the till, the fractures, and the contaminant (ANGLE, 2001).

Because unfractured till is impermeable, many had regarded it as the perfect aquitard to separate surface sources of contamination from aquifers. But till is brittle as well as impermeable and fractures for many reasons, so that (when fracturing occurs) contaminants can quickly penetrate sensitive zones below the till. The adjustments in DRASTIC make the maps far more useful and scientifically up-to-date than previously had been possible in glacial till settings.

Another approach might be to provide a simplified GIS mapping overlay which may be coded red (meaning stop), where fractures are known or highly likely, yellow (meaning caution) where fractures are fairly likely, and green (meaning go) where the likelihood of fracturing is low. The purpose of the tool would be to ensure that any proposed future land uses would be compatible with ground and/or surface water resources, in addition to the more common checks of zoning compatibility and transportation availability.

ODNR has continued (and continues) county scale suitability maps, first in the Division of Geological Survey and as part of the Ohio Capability Analysis Program and, later, through the county scale Ground Water Pollution Potential maps. Through all these maps, Ohio has county scale suitability maps for the whole of Ohio and specific land suitability maps for some counties – some since 1976. Unfortunately, these maps are not part of the landfill siting criteria. Thus, in one proposed landfill straddling a county line, the pertinent maps showed the proposed site was unsuitable and should have been dropped from the proposal out of hand. Instead the applicant spent $200,000 to confirm reluctantly the unsuitability of the proposed site. Surely the money would have been better spent using the maps to locate a more promising site.

Advances in landfill technology

Since the implementation of the Resource Conservation and Recovery Act of 1976, municipal solid waste (MSW) landfills have been engineered, built and operated as dry tombs to minimize the generation and spread of hazardous leachate from the degradation of the waste. This management technique leads to a reduction in the volume of leachate produced by minimizing the moisture allowed to enter the landfill. However, the low moisture content of the landfilled waste is prohibitive to microbial activity and therefore hinders the decomposition of the degradable portion of the MSW (DEWALLE et al., 1978). Current estimates of the time required for the decomposition of waste in a dry tomb landfill range from 30 to 50 years or more.

One of the current technologies being explored to treat landfill waste in situ is the recirculation of leachate to the waste mass to raise the moisture content, thereby creating a solid state bioreactor in which microorganisms degrade many of the components of MSW (PAVEY et al., 1999). The effectiveness of bioreactor landfills has been demonstrated in several full-scale trials (PAVEY et al., 1999; REINHART and TOWNSEND, 1997). The use of bioreactor landfills decreases the time required to degrade and stabilize the MSW to projected 10 years or fewer. This shortened lifecycle of a bioreactor landfill results in rapid loss of mass and subsequent settlement of the landfill. Once the landfill has settled, more MSW may be disposed of in the landfill, extending its useful life and creating a sustainable landfill. Using this technology, landfills can be public utilities that serve much like regionalized wastewater treatment plants.

A mosaic of decision makers

Those who did understand Ohio's glacial deposits and soils, especially the staff at Ohio Department of Natural Resources (ODNR), were then and continue to be institutionally tangential to the decision-making process. Like the U.S. Geological Survey (USGS), they perform a data collection and repository function. The actual decision making for many of the various potentially soil and groundwater polluting land uses falls to the Ohio Environmental Protection Agency, the Ohio Department of Health and its county health departments, the State Fire Marshal's Office, the Ohio Department of Agriculture (ODA), the Ohio Department of Transportation (ODOT), and the Public Utilities Commission of Ohio (PUCO). These agencies, along with ODNR and USGS, comprise the State Ground Water Coordinating Committee, an outgrowth of the Interagency Ground Water Advisory Committee formed in 1987 when Ohio first certified a groundwater protection program. (See table 1 for a fairly comprehensive list of all governmental agencies of Ohio needing to be informed about till fractures).

Although these agencies participate in or influence the more obvious land-use decisions that can lead to groundwater contamination, virtually any land-use decision has the potential to affect the quality of surface and/or ground water. Therefore, the list of decision makers needs to be expanded to include local and regional entities as well.

We should remember, though, how historically recent any governmental interest is in land decisions concerning pollution. Until the 1950s, little to no interest existed in landfill siting, solid waste or otherwise. The State of Ohio is an example of this history. Local health boards exercised whatever authority was available, and any positive effect on the environment was negligible. Only in the 1960s were state siting criteria created. Any existing landfills were made "grandfathered sites," to remain free of any new controls. Siting controls were strengthened in the 1970s, creating a new set of "grandfathered sites" and strengthened again around the turn of the 1990s. Not until near the new millennium did the first dialogue in siting criteria concerning fractured till appear in Ohio.

Table 1
Ohio organizations which influence land-use decisions

Organization	Level of involvement			
	Data	Planning Collection	Rule-Making	Decision-Making
Local, Regional and State-wide Planning commissions		x		
Health departments (state and county)				x
Soil and water conservation districts (one per county)		x		
County engineers' departments				x
Local and County zoning, building, and development authorities				x
County, Regional and State Departments of Development		x		x
Solid waste management departments, authorities, districts and private firms		x		x
Local and County-wide water and sewerage (store and wastewater) agencies		x		x
Multi-county Conservancy Districts		x		
Ohio Turnpike Authority				x
State agencies: Ohio Department of Nature Resources	x			
Ohio Environmental Protection Agency – Region V			x	x
Ohio Department of Commerce: State Fire Marshall's office (Bureau of underground storage tank regulation)			x	x
Ohio Department of Agriculture (pesticides and fertilizers)			x	x
Ohio Department of Transportation (road salts)			x	x
Public Utilities Commission of Ohio (pipeline, rail, and highway transport of hazardous and toxic materials, oversight of some private sewer/water companies)				x
Ohio Department of Development (siting and funding for new and expanded manufacturing facilities)				x
Ohio Water Development Authority				
Federal agencies: US Department of Agriculture	x		x	
Natural Resources Conservation Service	x	x	x	
Agricultural Research Service	x			
Farm Services Agency				x
Farmer's Home Administration				x
US Geological Survey	x			
US Environmental Protection Agency			x	x
US Fish and Wildlife				
US Army Corps of Engineers (wetlands jurisdiction, watershed management)		x	x	x
Village and City administrations"		x		x
Lending Institutions				x
OTHERS?				

Groundwater protection in Ohio

There is precedent in Ohio (as well as elsewhere) for full-scale groundwater protection. Beginning in the 1980s both the Miami Valley Regional Planning Commission (Darke, Preble, Miami, Montgomery, and Greene counties) and the Ohio-Kentucky-Indiana Regional Council of Governments (including Ohio's Butler, Hamilton, Clinton, Clermont, and Warren counties) instituted groundwater protection programs. These programs began by certifying portions of fourteen Southwestern Ohio counties as the Great Miami Buried Valley Sole Source Aquifer, a USEPA designation. As a follow-up, both agencies began an extensive inventory of existing and potential sources of contamination in their counties of jurisdiction.

These data bases were entered into early Geographic Information Systems (GIS) mapping programs. Funding for the programs came in part from Ohio EPA through USEPA Section 208 Clean Water Act pass-through allocations. The rest of the funds were raised locally from the member communities, business partnerships, foundations and through in-kind services. The Miami Valley Regional Planning Commission's efforts were more far-reaching. The long-range goal was to review every land-use decision as it related to groundwater protection. In addition, the Planning Commission was to assist in water-use conflict situations, helping to determine the wellhead protection for each of its member communities and the identification of critical groundwater resources. To a certain extent, the groundwater initiative currently undertaken by the Miami Conservancy District grew out of these earlier efforts.

The awareness of the importance of water has long historical meaning to southwest Ohio. The 1913 floods along the Great Miami River were devastating. While community after community rallied to insure that such destruction would never come again, even in the birth of massive engineering undertakings were the seeds of realization that natural forces, in the end, always win. Engineers design solutions which have finite life spans. It is that realization which drove the regional groundwater protection efforts in southwest Ohio. There was a grassroots understanding that some of the contaminated aquifers could not be remediated at any cost and that if the prolific groundwater reservoirs of the region were to be available in the future, they must be protected and preserved today. Groundwater protection became a daily point of discussion in the lives of average citizens. The efforts are funded with local tax dollars as part of the ongoing cost of local and regional government.

To a lesser degree, the same awareness for groundwater protection was spearheaded by the Toledo Area Regional Council of Governments in northwest Ohio and by the Northeast Four County Planning Commission in the Akron-Canton area and Northeast Ohio Area Community Council in the Greater Cleveland area. None of these programs reached the level of commitment found in the southwest Ohio effort, but groundwater protection, education and planning were undertaken through their support.

In all cases, only the most obvious contamination settings, those of fractured cavernous and karst carbonates, and buried sand and gravel aquifers, were recognized. Glacial till, on the other hand, was always considered a good, protective barrier to contaminant transport to the underlying aquifers. Even in northeast Ohio where George White worked for so many years, the connection to fracture flow in the unlithified till materials was not recognized. However, when fractured, till functions much differently than traditionally thought, no longer serving as a protective barrier.

OEPA has a wellhead protection section, but (as often the case for such programs state-wide) the program is voluntary, and few communities have participated in it due to economic and political considerations. Other states, such as New Jersey, have mandatory wellhead protection programs, and are therefore much more effective in protecting the aquifers that supply public water supply wells.

In contrast, Ohio has many designated Sole Source Aquifers. With parts or all of 20 counties contained in one of the five different Sole Source Aquifers in Ohio, Ohio has more area designated than any other state in USEPA Region V. The historical reason behind that is simple. When Ohio failed to pass legislation compelling Wellhead Protection Plans under a state-wide protection plan designating Critical Aquifer Areas in Ohio, local governments countered with the only other protection process they had – seeking Federal recognition for Sole Source Aquifers on this wide scale.

Ohio's subsurface fractures are of many kinds, depending upon the subsurface materials. Decision makers at many governmental and private levels must take them into account for protection of groundwater, surface sustenance, and prevention of volatile reactions from human actions. Emphasis is placed especially upon tools for assessing groundwater vulnerability and the legal framework for resource protection in fractured environments. Of course, case law that explains how the laws and regulations operate in confrontations is important, but not much case law exists in the case of fractures, least of all in the instance of till fractures.

All landfills eventually fail and siting criteria offer only minimal protection, at their best, from that failure. Thus, landfills placed on top of, or beside, sensitive locations (parks, public water supply aquifers, virgin forests, abandoned shaft mines, wildlife refuges, etc.) will fail to the damage or destruction of these areas allegedly protected from contamination. Maybe if we knew all the Sole Source Aquifers, 100 GPM sand and gravel aquifers, or wellhead protection areas that a growing urban industrial economy could ever need, we might just sacrifice the underlying materials to contamination. But we do not. We never shall. And so we must accept the widespread existence of fractures, and the likely continued inevitable failures of landfills.

Legal standing on till

As described earlier, the legal framework for groundwater protection had evolved in Ohio and other states from not dealing with the scientific basis for groundwater movement (the "occult" description that originated in the 1861 case of Frazier v. Brown) to using a porous media model of groundwater best applicable to sand-and-gravel aquifers (NOTE, 1986). The first opinion of a legal tribunal to formally recognize a new shift in the factual base for groundwater law in fractured till is CF/Water et al. v. Schregardus (1998).

In this case, the applicant wished to install a landfill. The commission found that beneath the site was a layer of till and, below that, aquifers. It found, also, that "the till layer would function as a barrier to vertical movement of groundwater and contaminants to aquifers" lying below the till, if the till were to function adequately as a barrier, 1998 WL 93972 1, p. 3. The presence of the aquifers required a waiver by the Director of OEPA that "deemed the siting acceptable." Id., p. 4. The applicant had to show a "thickness and lack of permeability" in the till sufficient to protect the aquifers. The Director was persuaded by the evidence offered by the applicant that the till layer was sufficient to protect the underlying aquifers.

The applicant had stated that the till was not fractured. Id., p. 6. Subsequent boring logs, however, established the existence of fractures in the till, thus allowing a "very fast time-of-travel equation" in water moving from the landfill into the aquifers sufficient to fail to meet the agency standard for an impermeable barrier. Id., p. 7. But an administrative "gap"

occurred between what the record showed the agency knowing institutionally and the information upon which final decisions were made by the agency's Director.

The Director formally "deemed siting acceptable," despite what was known institutionally. The Commission, on the appeal, had developed in hearings before it that the decision makers had not known of existing fractures in the till overlying the aquifers nor had the boring logs documenting the fractures been reviewed by these decision makers. Testimony stated that if the existence of these fractures in the till had been known by these decision makers, the "effective porosity figures" of OEPA could not have been met. Id., p. 12, and the application would have been denied.

Based upon these facts, the decision of the Commission was a narrow one. The Commission found that the Director's decision had been made upon an invalid factual foundation, which rendered the decision unreasonable, requiring disaffirmance of the Director's action, ORC sec. 3745.05. Thus, the Commission returned the decision to the Director "to conduct an investigation into the application in light of the undisputed presence of fractures in the till overlying the aquifers." The factual predicate revealed in this case is that (1) the presence of till is prevalent in areas where glaciation had occurred, (2) till is a material that is impermeable, and (3) till is a material subject to frequent fracturing, facilitating rapid contamination of aquifers below the till. In the presence of till, therefore, water from surface areas does not reach aquifers by "infiltrat[ing] the soil and percolat[ing] down, filling pores and cracks in rocks and other materials beneath the surface of the earth," as asserted in *Village of Pleasant City, supra*. That's the bad news.

The good news is that, as till is both impermeable and common, fractures in the till (1) allow aquifers beneath the till to obtain recharge and (2) are common in the till. While this rapid transport insures yearly recharge of our groundwater aquifers, it is a critical point of failure when contaminants are moving with that water. Therefore, the benefit of ample recharge to sustain aquifers requires a high level of groundwater protection on the surface. This protection is to prevent water on, or near, the surface from dropping rapidly and unaltered through the fractures in the till into any underlying aquifers. Providing that protection requires revision in the current common legal views as to how water can reach aquifers.

Law cannot but help to follow science, technology, economics, and other social forces. Law scarcely can go far ahead of them, either. Even so, law can be inventive in its rules, though prematurity can render a rule academic. The Anglo-American courts in the early to mid-19th century had developed all the rules potentially (and, actually, at a later date) available to protect groundwater both qualitatively and quantitatively. The choices were not made by courts on any abstract, predetermined rules. The decisions were based, instead, upon economic grounds and upon what contemporary earth science, at that time, did – or did not – know about groundwater. "[R]ule choices were known and were varied, contradictory, credible, and difficult for judges who knew that these decisions would have important economic and social, as well as legal, consequences," (MURPHY, 1991, pp. 57-58). The same is commonly true today.

An earlier – and widely considered – case preceding C/F Water, Inc. v. Schregardus (1998) had an inkling that facts in glaciated areas might not be as they had been described under other conditions, Village of Wilsonville v. SCA Services, Inc., 86 Ill. 3d, 426 N.E.2d 824 (1981). In this earlier case, a landfill actually had been installed above a layer of till below which lay an aquifer. The landfill had leaked and a nuisance action had been brought to mandate the removal of the landfill. The testimony in the case is interesting in light of what is now being discovered about till fractures.

A USEPA task force had determined that, "the glacial till which lies under the site is quite dense and essentially massive. . .", Id., 426 N.E.2d 824, 839. In fact, the till was 40 to 65 feet thick. Permeability tests had shown repeatedly that the till was "not very permeable" and, indeed, had low permeability. Id., 828. Despite this, the experts had opinions – not supported in the Court's opinion – that the till was more permeable than any test had indicated. Id., 832. Testimony was present about "fractures;" but none seem to have been related directly to the till, probably due to the subsidence caused by an abandoned mine. Id., 829. The court was little interested in these then ambiguous facts and decided the dispute on grounds unrelated to till fractures, basically that a nuisance somehow had been caused by the pollution of an aquifer supplying water to a wide area. Yet, even so, the experts had come tantalizingly close to the role till fractures can play in a glaciated area.

One cannot put aside, of course, the painfully developed scientific bases for groundwater law developed in the United States throughout the 20th century. Professor Charles Callahan, who wrote on Ohio water law in the mid-20th century, wondered if Ohio would have a scientifically-based groundwater law by the end of the 20th century (CALLAHAN, 1959). Until 1984, Ohio common law left in place legal institutions providing landowners with "no capability or authority ... to manage ground water supplies which are in the ground – even in their own land – in the face of other demand" (COOGAN, 1975). Nor were most other Anglo-American jurisdictions better off.

No one suggests a return to such chaos. All that is required is a supplement to the knowledge which is the base for current groundwater law. Where glaciated till exists, courts and administrative agencies must recognize that another factual predicate often applies rather than the now traditionally accepted one. Greater limitation on permissible surface actions above the till is required, if pollution is not to occur in aquifers underlying fractured till – and unfractured till is not likely to exist, or at most is a function of total till thickness. Though potential actions based on different expectations would be permissible, they are not to be allowed, once the presence of till fractures, and aquifers underlying them, has been established. Standards that would deny these problems (or do not directly assume responsibility for protecting aquifers in glaciated regions) should not be adopted. Tradition is not enough. Too much is at risk for administrators to act differently.

Legal framework for groundwater protection

Our proposed process is to incorporate scientific knowledge into an institutionalized process that will be used in decision making.

- First, a risk screening tool that incorporates fracture information needs to be developed.
- Educational outreach is needed to demonstrate the importance of fractures to the general public and to the decision-making community. This is being accomplished through publications including the *Ohio Journal of Science,* vol. 100, issues 3/4, workshops, and a clearinghouse web site.
- It is essential to go beyond education, and institutionalize the process to check for fractures by creating a supportive legal framework. Such limitations can be written into state statutes or local codes (perhaps by defining fractures as a zoning hazard), but would best be served by a statewide standard for fractured till areas to support local zoning laws.

Why is it necessary to institutionalize the process? Because

without that, it will not matter what is academically known about the fractures, and our planning and decision making will continue to ignore their existence and larger implications. True, wise use of the surface will lead those wise users to educate themselves about the best location for landfills or other uses with the potential to contaminate. The law must level the playing field with mandatory regulations and the final step for these regulations will be to meet challenges in court, for there will be challenges. The new processes need these changes in law.

While developing a new legal framework for till areas in order to protect underground conditions or interfaces with them, certain matters must be kept in mind. We must beware of making and applying rules without full knowledge of site specific conditions. Currently we are struggling with land-use decisions made 25 to over 100 years ago. Some were made indifferently, but many were made with best available knowledge of the time (though varying site specific knowledge). As a society, which must live with such events for protracted periods, decisions require the most careful drafting of laws and their application in the field, seeking as much foresight as humanly possible.

Regulations should be extremely conservative in providing exemptions, waivers, and variances. How wide should a setback zone be within which a certain activity is forbidden beyond which an exemption is extended to that activity? Should the setback or protective zone for a federal or state park, or a recreational or virgin land area, be 500 feet, 1,000 feet, 2,000 feet? Or should it be determined on an individual site basis with even more potentially generous setback terms? Many of the fixed setback terms have proven pitiably inadequate to provide protection. How far should the up-gradient water supply setback be to protect a well field? Contaminants from landfill gas can be carried far greater distances than previously thought. Regulation needs to document cases concerning up-gradient gas migration in different settings and develop a scientifically-based buffer zone that can be applied to the characteristics of each site, rather than rely on an arbitrary fixed distance.

Underground geologic pathways include both primary porosity and secondary fracture flow. The latter need to be monitored, or maybe remediated, while both situations need to be calculated and continuously monitored. As much needs to be learned in advance of permanent action as possible and certainly needs follow-up monitoring. Some models do not work on other than primary porosity, so models need to be used that are not so confined in their purposes. Expensive? Time consuming? Yes, but important. We have exchanged the occult for the complex.

Many maps exist as resources and need to be employed on a larger scale than is now the case. One is the digital USGS 7.5 minute topographic quadrangle, with the scale corrected to one inch = one mile. Its use requires basic understanding of Geographic Information Systems (GIS) available for any particular state and the software to process it. All county soil maps should be put into GIS form, so that surveyors and soil scientists will be familiar with the system. Indeed, one of the problems is the great number of specialists who are involved in providing information or analyzing information being provided by other specialists, such as geologists, geological scientists, soil scientists, pedologists, as well as surveyors and professional engineers. Specialists cannot venture far from their disciplines because educations do not cross over and the ignorance of a specialist in one field can be as great in another field as that of any layman. Teams – including, at a minimum, stratigraphers, glacial geomorphologists, structural geologists, and soil scientists – should be used. Descriptions of material that can be commonly used by these various disciplines are also needed – even if they have not been developed as yet.

Deposits should never be simply investigated on a grid basis. While a grid can serve as a beginning, the information gathered from one boring dictates the direction and distance needed to set the next boring, but it is not a sufficient investigation in itself. Traditional borings are often not the best investigative method for unconsolidated materials. Often pits are needed, as well as angled borings, to identify accurately the conditions present in unconsolidated materials (CHRISTY et al., 2000). The same is true of picking a single depth for tests because depths in humid areas of the saturated zone may extend only into the annually recharged vadose zone if a fixed depth has been preset by regulation. There are no short cuts in gathering needed information if the information sought is to be sufficiently accurate.

Reflections

While developing a legal framework for groundwater protection in fractured environments, several things should be kept in mind. We must beware of applying rules and assuming protection is thereby achieved when those rules were not promulgated with full knowledge of the site-specific conditions, especially in the case of fractures. We should recognize that we currently are struggling with the bad effects of land-use decisions made 25 to 200 years ago (e.g. Superfund); let us learn from our history.

Given the tools already available for assessing groundwater vulnerability, and the research-based knowledge of fractures already in place, taking fractures into account in the decision-making process is not difficult. It involves looking at site-specific information, reviewing all available documentation (including the fracture web page) and performing any additional on-site tests. Taking fractures into account is important for good decision making, as is taking the long-term point of view. Our recommendations are threefold:

- Require that any site being considered for development be screened for fractures.
- Educate local decision makers who ultimately make the final decisions or, if not made locally, then at whatever level the ultimate decision must be made. But even when the decision is made at some higher level, local people must live with the consequences of the decision and need the education to know what the consequences of the decision will be so, at the least, they can oppose or seek to modify that decision.
- Recognize that decision making is as fractured as the fractured geologic space itself.

Much site-specific information is now available, while more site-specific knowledge can be obtained as needed, including on-site tests. Expensive? Yes. But costs paid by permittees and applicants for permits are already high, without guaranteeing certainty or providing protection from imposition of heavy future costs. Politically burdensome? Yes. But under the present operations, how successful is avoidance of political risk? Not very, even in the not-too-long run. This approach offers protection to wide ranges of the environment, avoidance of damage sometimes uncorrectable or correctable only in geologic time, and an avenue to such technical improvements as the sustainable bioreactor landfill. These would be substantial improvements, in economic, political, and scientific terms. They need not be foregone.

We, as a society, have to make decisions looking at the longer term, because that's the scale at which we should want the benefits to exceed the initial costs. Political office holders may be thinking only of their terms of office, but a community as a whole must think longer-term. People who live in the area need to become educated about issues and be encouraged to

participate in the decision-making process. Ultimately, most land-use decisions are site-specific and are often made – certainly heavily influenced – by local governments and private citizens.

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Shifting from physical to electronic space: The making of electronic Ecumenopolis

Mit Mitropoulos

The author has been involved in communications with and without technology, and was invited editor for the October 1983 issue of Ekistics. *His Ph.D (Edinburgh University, 1974) was on Space Networks – the concept of space as a network rather than as place. As a student, he participated in the 1969 Delos Symposion on Networks. He has been a consultant to various organizations and institutions (including UNESCO; EVR of M.I.T., USA; C.I.C., Paris; the Greek Ministry of Culture) on issues connecting technology to policy legislation and culture. His work focuses both on large-scale areas – for four years he was a member of the IDATEurope scientific council – and also on isolated human settlements, specifically islands for a telecommunications development with simultaneous use of geographical distance to safeguard identity. In the field of art-science-technology, he was with the C.A.V.S. of M.I.T., and has been active with geopolitical projects and project-proposals, as well as with a series of 2-way interactive video installations that articulate electronic space. Dr Mitropoulos is a member of the World Society for Ekistics (WSE). The text that follows is a slightly edited and revised version of a paper presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.*

Introduction

Just like outer space, Electronic space is a relatively new space, although the latter has operationally been with us for almost 100 years. Only a small percentage of the planet's population benefit from these 1-way and 2-way systems that articulate Electronic space. It is however a global issue, because the use we make of it has worldwide consequences for all. But also because problems faced by the rurally-dispersed, the mid-sea isolated, big-city inhabitants and underdeveloped populations may find solutions in it – quite often the only answers for them are in Electronic space.

Just as Berliners found themselves Cold-War separate, although simultaneously historically together, any wall articulates space and the interaction of people on either side of it. Any telecommunications system does the same. It is both exciting and necessary:

- to look into Electronic space issues from a variety of disciplines, from how traditional human settlements are currently run, to art-science-technology activity;
- to examine a range of items from the impact networking has had on social cohesion to the public policy vacuum within which we have allowed our information and communications systems to develop as part of the globalization process;
- to formulate questions relating to human settlements; and,
- to look, in summary, into how more and more people are moving from Physical into Electronic space.

Electronic space, and articulation of it

We have been facing two population shifts – both relating to a variety of inequalities at the global scale:

- the one has us watch the annual rate of urban growth – and yet we (unlike physicists) cannot hope to have a unifying theory on how a city works;
- the other, the one I have been looking into, is people moving from Physical space into Electronic space.

Keen observers have spoken on this early on (from the early 1980s – Mario Costa 1990) and recent figures in the international daily press (however scattered and non-focused) have been quantifying the phenomenon – a good source remains the IDATE Internet World Atlas being regularly updated (IDATE, 2001).

But unlike media hype, and as latecomer sociologists would have us believe, this shift is not due to information/communications technology. Technology has simply been proven state-of-the-art to fit a social phenomenon that preceded the Internet by maybe three, certainly two decades: people in general, and women in particular, sought to be autonomous – of the place they were in, and of those they related to. People have been moving more and communicating more. By doing so they create distance, and then want to bridge it. It is interesting to check on the information coming both from the Physical and Electronic domains, and articulating Built space as well as articulating Electronic space so to speak (MITROPOULOS, 1986 and 1991). They are relating on distance that is to be overcome – an activity that we are all familiar with on a daily basis when we are using an opening in the wall or using telecommunications – but also on creating distance that is not there, like building the Berlin Wall. I mean the Cold-War *Mauer*, or setting up the Face to Face-1 installation (fig. 1) in the art-science-technology context, where people like myself believe most of exhibited art is decoration only, and one theoretician and tenacious organizer announced the end of art as you know it (COSTA, 2000). Let me add here how it has been characteristic of telecommunication processes that when we connect to the other person we remain isolated from that same person at the same time: we are Together/Separate (MITROPOULOS, 2000b), and this has

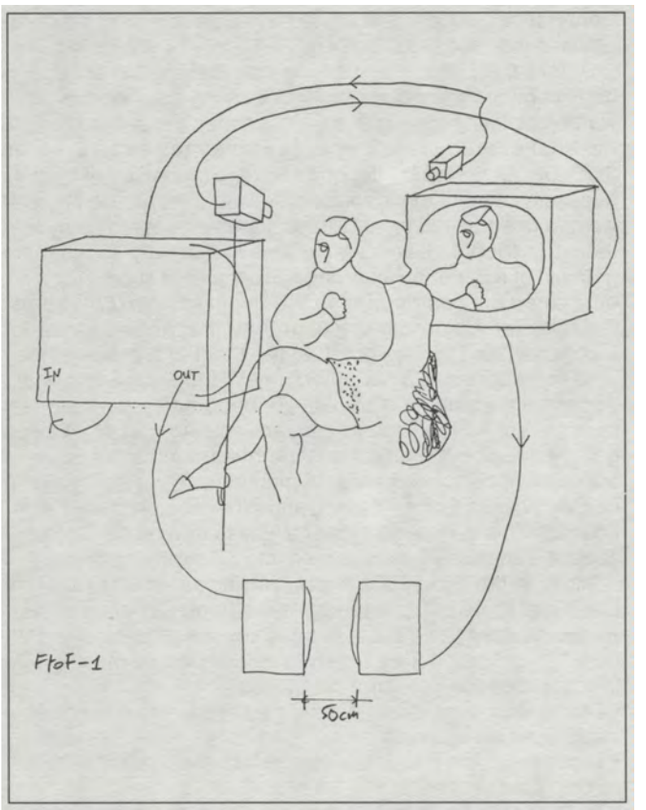

Fig 1: FtoF-1 installation has the two participants feel the back of one another from behind, whilst seeing each other in front. The installation was originally set up in a workshop at the Hellenic-American Union, Athens 1982. It was then developed at EVR of M.I.T. in 1983, and presented at CAVS of M.I.T. in 1984, Salerno 1986, Montreal 1995 (the above drawing).

always been one way to organize Built space for access and privacy. This is the case for semi-private/public spaces (MITROPOULOS, 1976) in the traditional architecture of the islands in the Aegean Sea (fig. 2), and the same also goes for the Internet.

I should stress that by "Electronic space" we certainly do not limit ourselves to the Internet, although we do specifically focus on interactive exchange, whatever the technology.

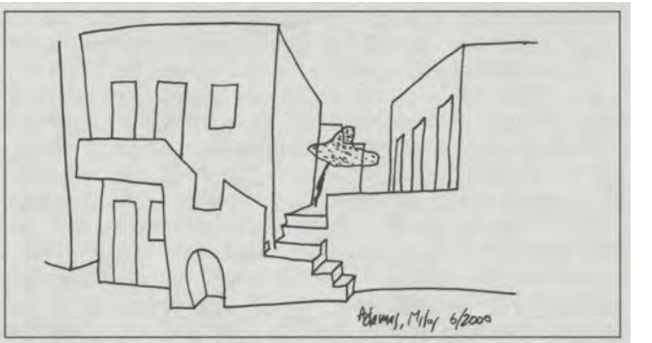

Fig. 2: Semi-private/public spaces permit/afford/solicit even, communications between the public and private domains. Here is an example from Milos island in the Cyclades – an outside staircase type, unusually combined with an elevated open hall (2 of 10 types).

After all, Electronic space has been with us for almost 100 years, from the time of Marconi. We can, for instance, refer to the exciting radiowaves environment of the Battle of the Atlantic in World War Two, a battle of wits between the U-boat wolfpacks below, and the surface vessels moving in convoy formation from the USA eastwards.

Space as a network, and social cohesion in it

The early research I did in the late 1960s as a student (MITROPOULOS, 1969), then in the 1971-1974 period in Edinburgh was on Space Networks (MITROPOULOS, 1974, then 1986, and 1997a), meaning space as a network rather than as place (fig. 3). This was based on personal observations having grown up on ocean-going ships, then having given as a definition of Architecture "the organization of space for movement and communications," and finally having checked with experts in Ekistics during their stunning summer research meetings, including the Delos 1969 trip to which I was invited by Panayis Psomopoulos.

Looking at space as a network made it easy for me to move into issues of Electronic space, and especially so when in the late 1970s (a specifically exciting period for telecommunications debate and application) I moved to M.I.T./USA for one year and stayed for seven. But such network concepts had already helped me understand what was really going on in my village (MITROPOULOS, 2000a) in Greece, when it was be-

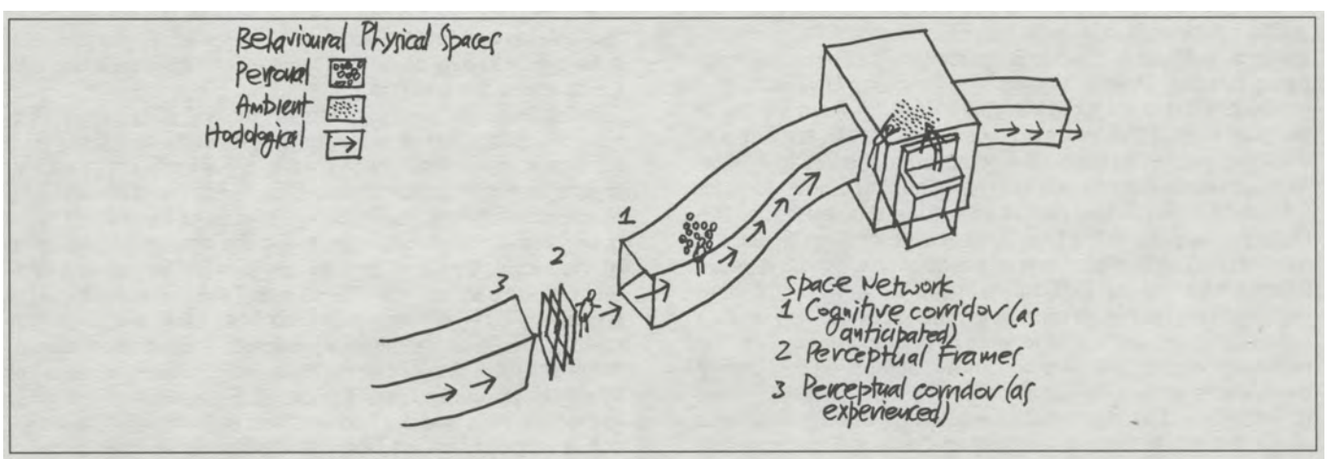

Fig. 3: The Space Networks concept.

ing networked for water on tap, electricity, telephone exchange and transportation by land. Social cohesion became fragmented before we were afforded access into Electronic space: water at home meant that people would no longer be gathering around the communal well to get it, and exchanging information in the process, and gossip too (in distant neighborhoods water would arrive in containers carried by mules – and people would gather around them for the water, the information and the gossip). This was even more so when we were wired for electricity 24 hrs a day, instead of the village generator providing us with artificial light from just after sunset to just before midnight – meaning that we had, up to then, shared a communal daily lifestyle. Personal end-equipment for every home connected with the twisted wire of the telephone had an impact on long-distance, but surprisingly even within the neighborhood. And finally (in the late 1960s) the road connected the village not only to the settlements on either side of the coastline (as people had thought) but beyond it, making the villagers' behavior change from that of an isolated island to that of an Athens suburb, three hours from the downtown area of the capital which housed almost half of the country's population, all eager to abandon it every Friday afternoon (MITROPOULOS, 1999 and 2000c). So much for social cohesion in networked environments, leading to one more village gradually being run as a business rather than as a community, long before we in our village got our first Internet Café which happened this 2001.

In the early 1980s, I checked into the future of social cohesion in urban communities, whilst doing research for UNESCO and EVR of M.I.T., on 2-way interactive cable TV systems in the USA (MITROPOULOS, 1983). Having checked on about 3,600 systems, it became clear to me early on that we were operating in a worldwide public policy vacuum, taking policy as related to use of technology and also legislation – of privacy abuse potential, for instance. Besides the privacy issue, I was impressed by the subtle but clear differentiation in 2-way systems: between interactive as opposed to "response" systems – a differentiation forgotten for marketing reasons – even in the originally non-commercial art-science-technology field. Most of what we today call "interactive" systems in fact are not. The choice of technology means a social cohesion choice in fact (although never announced as such) between community participation systems versus the home-subscriber targeted as consumer, with privacy abuse potential added on.

Public policy and personal autonomy

These above were Electronic space issues focusing on the public policy void in information/communications systems. Being a new space, Electronic space was easier to tackle for being relatively free of vested interests, and UNESCO had come up with the splendid MacBride Report – Sean MacBride as head of that Commission (MacBRIDE, 1979), himself addressing the 1979 ITU on the occasion of the World Administrative Radio Conference with his "Shaping a new world information order." The rest is unfortunate history after the U.S. government at the time felt insecure enough to pull out of UNESCO, with disastrous consequences. And 3-4 years later we had IBM and DEC move into M.I.T. to wire it for moving larger quantities of data at greater speeds – again in a public policy vacuum, and in spite of efforts of many learned people at the Institute. We had known at the time that unless there was a worldwide public policy (be it the UNESCO one, or another), that void would be filled by the marketplace alone, leading to today's unstable environment on the global scale – just as was predicted at the Vancouver 1976 Habitat Conference, a document signed by 28 people, 8 of them ekisticians (MITROPOULOS, 2001).

Before that, whilst networking was making almost everybody in my village delighted for becoming autonomous, with women claiming the night, having claimed the day, and on to the kind of autonomy they enjoy today (as sailors' wives (MITROPOULOS, 1987) they had always exercised, if only by necessity, a spirit of independence within responsibility, and we had already had in our village a memorable lady mayor in the early 1960s). It was at that time in the early 1970s that I got hold of a paper by an architect-researcher known for work other than his contribution to the book *The Next 50 Years.* Christopher Alexander (1968) argued that people strive for autonomy, and having got it, at the sight of a problem they tend to withdraw. To his Autonomy-Withdrawal Syndrome I added "at the sight of a problem, or opportunity, whether real or apparent." Needless to say, advertising had often been going beyond information to generate an endless stream of apparent opportunities – not to mention current lifestyles, including access to the Internet, and other screen-based interactions. This syndrome was one way to have anticipated the current shift from Physical space into Electronic space.

When in the mid-1990s the Social Research Unit (SRU) of DG-XII of the CEC, put together the book *Cyberspace Reflections,* they gave me a copy to review (BOLHUIS and VICENTE, 1995), and it was then that I put people moving into Electronic space into three categories:

- Those who operate on occasional entries into Electronic space, as an alternative;
- Those running a parallel existence in both Physical and Electronic spaces; and,
- Those using Electronic space as a substitute for Physical space.

When? I believe whenever they feel they have a better chance in Electronic space, for reasons of diminished social cohesion in Physical space, the difficult face-to-face interpersonal relationships in it, the end of ideologies, or the systematic disappearance of semi-private/public spaces including urban spaces that function as such – as with downtown Brussels in the last 10 years, so with my village.

On articulating space, electronic and physical

Regarding the articulation of Electronic space, it takes the same aesthetic curiosity (beyond the specific task of communications) to benefit from any of the Face-to-Face (FtoF) installations – as with the semi-private/public spaces in the Greek islands, as well as with the minimal architectural gestures of constructions destined for remote coastal sites (for the latter see MITROPOULOS, 1998). But let us start by considering both overcoming distance, and also creating distance where there isn't any.

In the first case we find ourselves making daily use of a variety of systems to tele-communicate. For those interested, I strongly suggest they check on the real-life city-scale "experiments" as reported on, outlined, compared, and conclusions reached in Mitropoulos, 1983 (the case of Reading, PA, in opposition to Columbus, Ohio). On the other hand, in terms of the simulation-portable scale, and in the art-science-technology context, the FtoF-2, and FtoF-1 installations respectively do overcome (the one) and create distance (the other), using minimal video equipment. This is better shown in the proposal (fig. 4) that has four FtoF installations use the same equipment as we pass from FtoF-1 to FtoF-4 to FtoF-3 to FtoF-2. Also see the two versions of the FtoF-4b installation, specifically on the Berlin Wall subject: we have a transportable wall (fig. 5), then the same installation concept as it

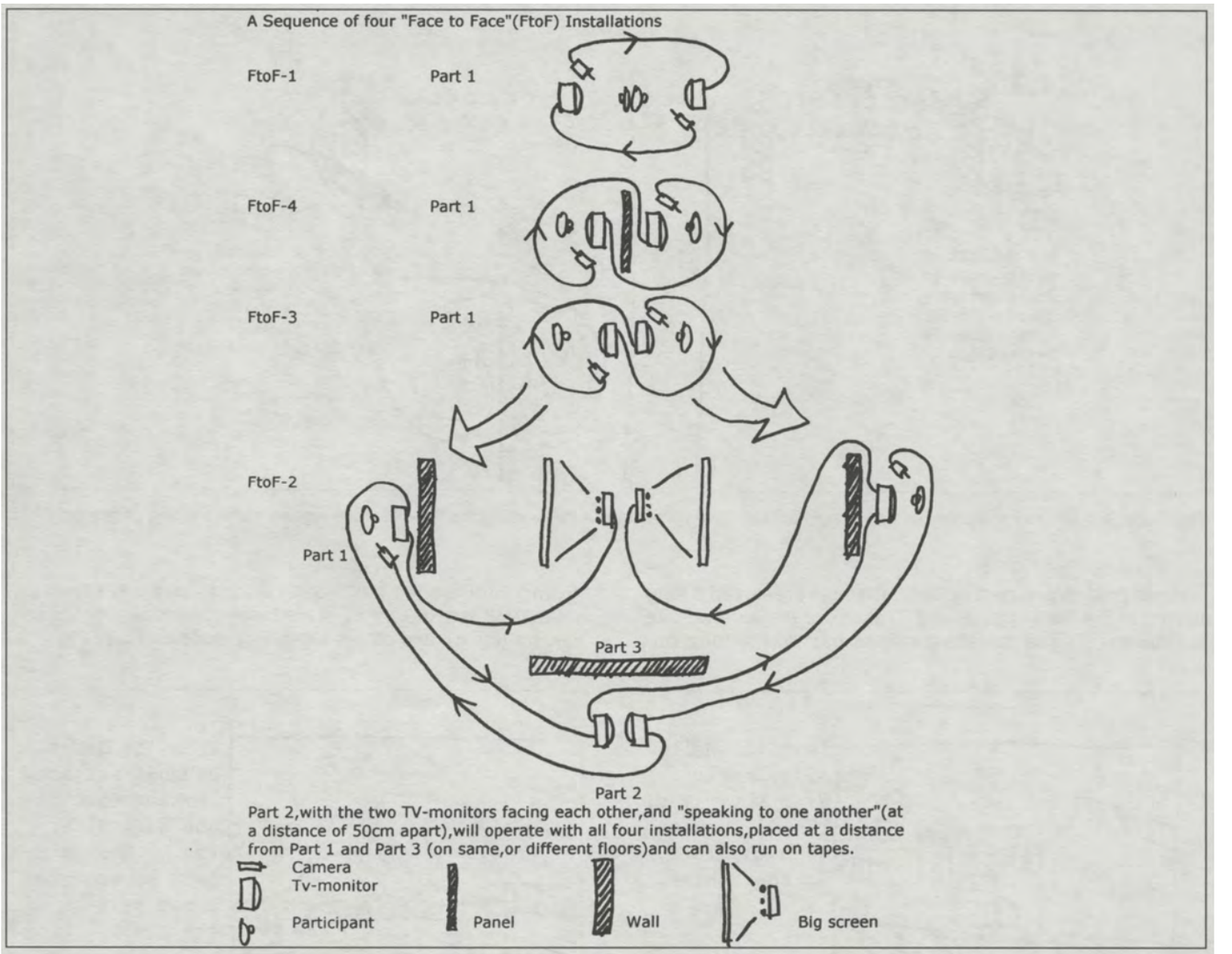

Fig. 4: The sequence of four Face-to Face installations (all 2-way interactive) using the same minimal video equipment: FtoF-1, to FtoF-4, to FtoF-3, to FtoF-2 (we can also start with FtoF-10 leading on to FtoF-1).

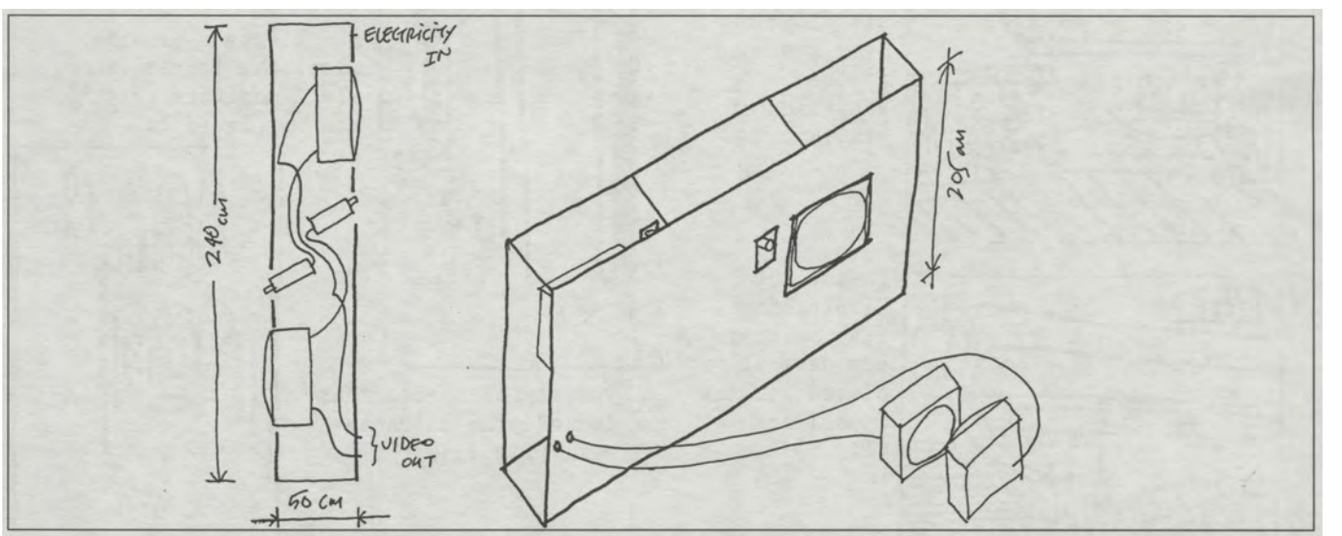

Fig. 5: "Instant *Mauer*" as part 1 (of 3) of an FtoF-4B proposal relating to Berlin. This is a transportable section of a "Wall" made of wood. It is wide enough for a technician to squeeze inside. It has built-in cameras and monitors. Because of its plug-in approach, it can be moved over to sites next to remaining parts of the Berlin Wall.

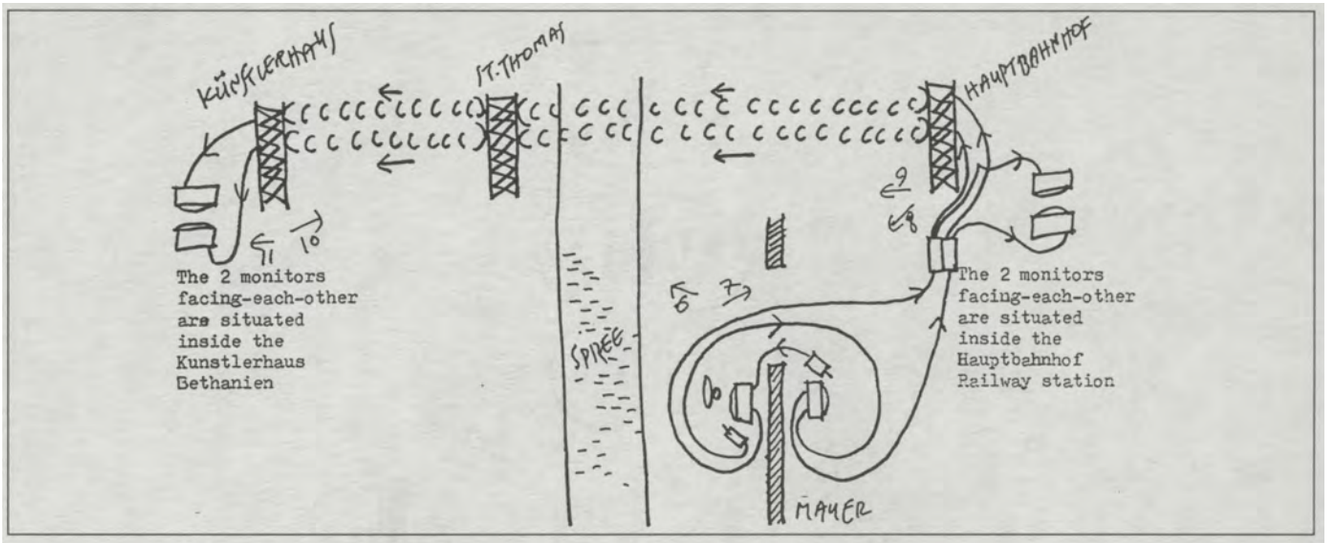

Fig. 6: On Site *Mauer* installation, as part 2 (of 3) of FtoF-4B. It provides for transmitting the Face-to-Face signals within the city, or beyond it.

extends itself over a part of Berlin that has preserved a long stretch of the Wall (figs. 6 and 7, as six of the nine on-site sketches). These installations are part of the long on-going FtoF series (MITROPOULOS, 1991; POPPER, 1993; ORDONEZ FLORES, 1996), some being room-scale, or fitting a square (fig. 8), and others extending worldwide (see FtoF-1 in

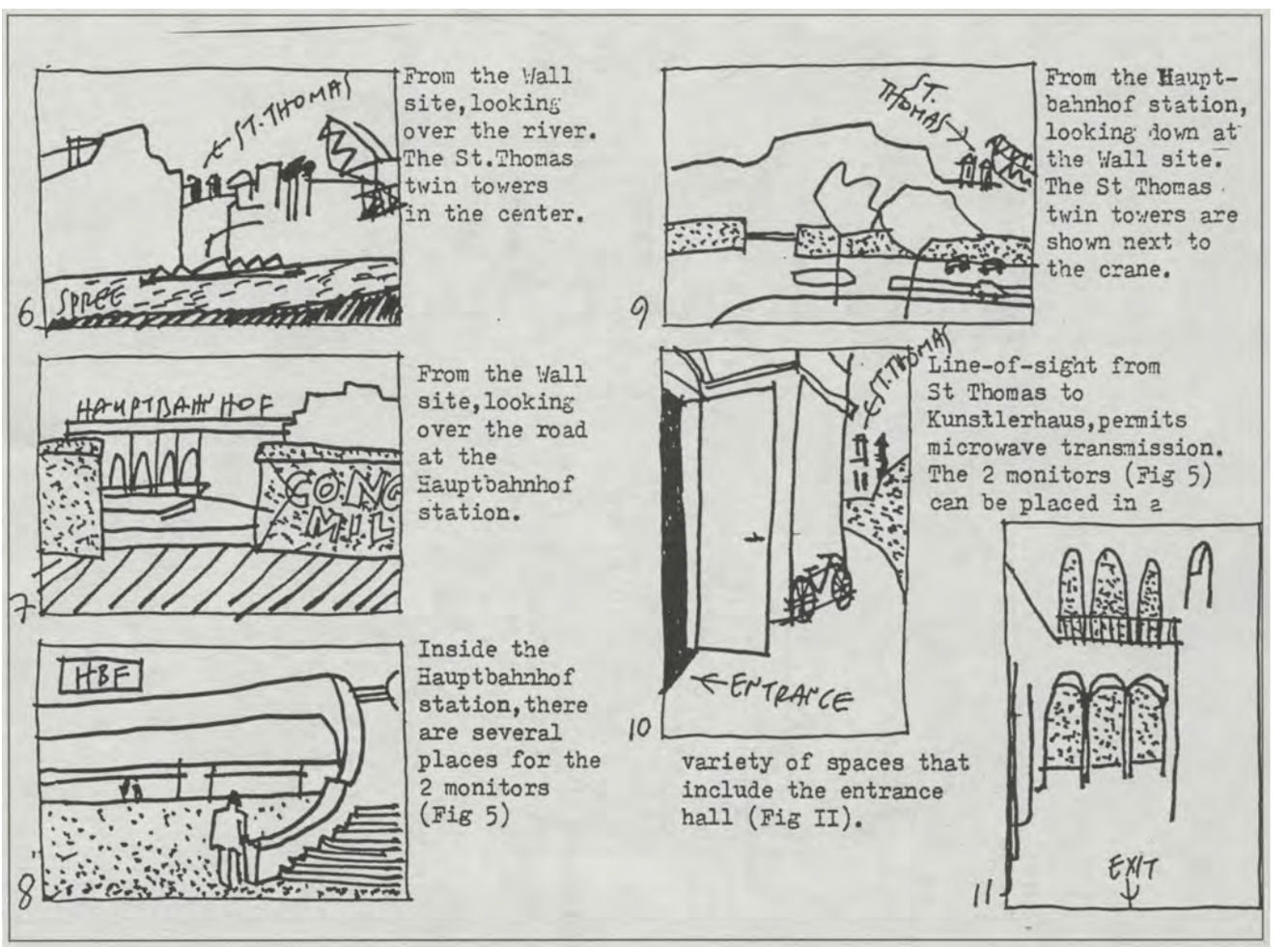

Fig. 7: Drawings 6-11 refer to Figure 6.

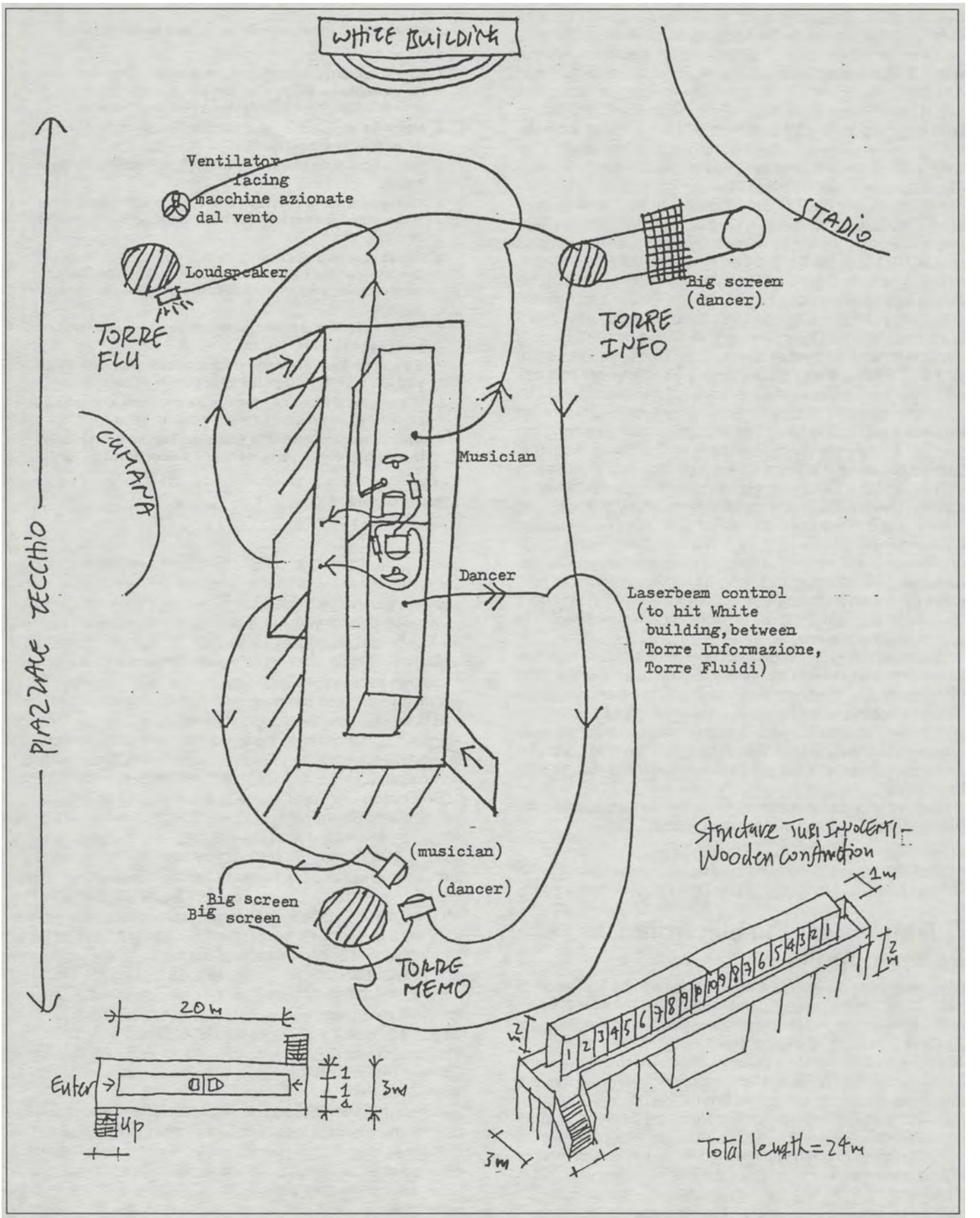

Fig. 8: FtoF-4N invited proposal to Mario Costa for Piazza Tecchio-Fuorigrotta, Naples. The piazza is next to the Cumana transport node, and the football ground-stadium. It is rigged with 3 electronically-equipped towers *(torre)* – see Mitropoulos, 1992. This type of installation provides the direction of my proposal-response to the invitation for Artmedia, Paris, November 2002.

COSTA, 1990). They developed in the work context of E.V.R. of M.I.T., and are due to the fruitful collaboration on communication issues (on both application and theoretical levels) with E.V.R. director Dr Edwin Taylor (Relativity physicist) and Assistant-Director Ms Niti Seth-Salloway (Media). The E.V.R. team (subsequently as EVP within the M.I.T. Media Lab) was responsible for running the M.I.T. campus-wide cable TV system, with an uplink (return-signal) capability. We were also interested and involved in the heated U.S.-wide debate on communications technology (myself being a member of the original City of Cambridge Cable TV Commission – M.I.T., like Harvard, being a Cambridge-based establishment). For an outline of FtoF-2 when activated, see MOEGLIN, 1986; for FtoF-1 see COSTA, 1980, DE KERCKHOVE, 1995, and also MITROPOULOS, 1991 and 1997a. Finally to describe briefly FtoF-1, for the reader interested in articulating Electronic space for communications, as with figure 1: we have two lady participants sitting back-to-back, a physical contact in Physical space. Each faces one TV-monitor and one video camera respectively. Each camera focuses on either lady, and carries the signal of her over to the TV-monitor in front of the other lady. This results in either of the two ladies feeling the other behind, whilst seeing/hearing her in front. As they start communicating and get involved in that interaction, there is a point after which they find themselves sucked in by the Electronic space that affords them this interaction. The equipment necessary is evidently minimal, and is the same that we need for FtoF-2 (and other FtoF installations too). Furthermore, if we have two more TV-monitors (as shown at the bottom of figure 1), we can carry both signals over to these monitors, and as they are placed to face one another at a distance of 50 cm, the two TV-monitors "speak" to one another. Both ladies seem now to exist in Electronic space alone.

Whilst exploring Berlin on foot, I came up with the information that the city had in its historical past been enclosed by three walls: The Medieval boundary, and the Baroque fortifications were of course meant to keep invaders out. The third wall, however, was to keep dissenting soldiers in (an early reference to the Cold War Wall in fact), and so with goods for which export tax was not yet paid – it was the 3 meters high Excise Wall.

I believe it is also necessary to clarify that interactive systems differ from "response" systems in that:

- Both sides can initiate the exchange;
- Either side can ask any question that may be irrelevant to the task at hand, and furthermore pursue a complex interaction.

Questions for the electronic Ecumenopolis

I had always considered Electronic space to be just another Behavioral space, along with Hodological (of Kurt Lewin), Ambient (as intended for communications), and Personal (of Hall and Sommer). Cyberpsychologists (THOMPSON and LIM, 1998; KING and BARAK, 1999; MONAHAN-MARTIN, 1999; GRIFFITHS, 2000) have systematically observed in the last five years abnormal behavior, briefly: gambling, pornography, and inability to control frequency and duration of entry into cyberspace (table 1). Also a wide range of people, from social activists to financial institutions, argue on the privacy abuse potential – one result of the public policy vacuum in which the Internet has developed, as with the anticipated consequences of 20 years ago: having Cyberspace gradually becoming strictly what Information Superhighways were intended to be – a tool for commercial gain and the national security argument (the latter better known as Big Brother control). Furthermore, a number of us have been struck by the instability of cyberspace: whereas in the Physical world you can depend on a good friend or your mother who always comes through for you, in Electronic space you must depend on Technical Support of your ISP (Internet Information Service Provider), that usually does not come through! Besides non-secure confidential exchange, and "message sent" not meaning "message received" (but having been sent out, and doing well out there, somewhere), furthermore, over 20 Megabytes of messages received and waiting to be read can in fact block the system – they blocked mine (I ask people I communicate with, for 10-20 Kb messages and often get 1000K ones). And yet, there is a continuing shift from the Physical into Electronic space (WELCH, 1998; MITROPOULOS, 1998a; BERTRAND et al., 1999; WALMSLEY, 2000; FORMOSA, 2000; BURKE, 2000; THERIN, 2001; PROWSE, 2001), which is just like moving into the slums of the big cities, or volunteering for the unstable environment of the WW2 Battle of the Atlantic: surely unstable for being at sea – hence the necessary weather reports sent from the U-boats back to base command, that ended up helping out the Allied codebreakers at Bletchley Park (HARRIS, 1996; HODGES, 1983). Not to mention the instability of being at war – meaning that if you could improve your radar you would read the movements of your adversary, and if you could break the Naval Enigma code, you could read his communications as well. All these are facts of the history of World War Two (BUCCHEIM, 1979; WERNER, 1998).

Although screen-based communications are a poor substitute for the physical face-to-face (whether in the case of the Greek Agora in the Greek Polis, or in contemporary telemedicine exchange), they do provide for solutions which at times are the only ones to have. With Electronic space here to stay, we should agree that a good part of the city-space is Electronic space: we live in a global electronic polynesia, an Electronic Ecumenopolis in fact. Therefore it is necessary to formulate questions such as:

Table 1
Guidelines for children on how to be safe on the Internet

1. **Never tell anyone that you meet on the Internet your home address, telephone number, or school name, unless you are given permission by a parent or carer.**
2. **Never send anyone your picture, credit card, or bank details (or anything else).**
3. **Never give your password to anyone – even your best friend.**
4. **Never arrange to meet anyone in person that you have met on the Internet without first agreeing it with parent or carer.**
5. **Never stay in a chat room or in a conference if someone says or writes something that makes you feel uncomfortable or worried. Always report it to your parent or carer.**
6. **Never respond to nasty, suggestive or rude e-mails or postings in Usenet groups.**
7. **If you see bad language or distasteful pictures while you are online, always tell your parent or carer.**
8. **When you are online, always be yourself and do not pretend to be anyone or anything you are not.**
9. **Always remember that if someone makes you an offer that seems too good to be true – then it probably is.**

(*Source*: Griffiths, 2000).

- How can a Physical-Electronic space continuum best be attained?
- How can it be used for social cohesion within the Big Cities?
- How useful can it be for interpersonal relationships at any distance?
- How could it fit into the sustainable development of isolated human settlements?
- How could it become part of a globalized public policy, to fill in that vacuum, taken over by E-commerce alone?

This challenge seems all the more urgent now, after the double hit on the World Trade Center twin towers on September 11, 2001. It was a blow to our open society, and specifically to our movements and our communications.

Questions from the floor

To conclude, I would like to add, for the reader of this paper, that there were two questions from the floor at the presentation of this paper:

- The first one came from Serge Antoine who, having been a French government Haut Fonctionnaire, asked the governance question regarding global public policy: Who will govern?
- The other was from Barry Rae, a practising architect in New Zealand, on whether the quality of Physical space has now become more important than ever before: Has it?

• The governance issue has become a priority for environment issues (see the current Kyoto agreement/disagreements) and the on-going process of globalization (see the UN Habitat Report, 2001). One can also ask "Who will govern the cities?" (see the review of the Habitat Report), and the fading out of Cyberspace hopes into the Information Superhighways reality is not encouraging (starting with the 1984 project Athena funded by DEC and IBM at M.I.T., and concluding by having E-commerce standing for worldwide policy). The latest effort I know of (of which I was part, as a Greek Ministry of Culture expert) was launched in November 1997 by the Council of Europe to relate culture to new technologies. In fact, the group of experts originally put together was in part made up of people who had been involved in early art-science-technology work, meaning highly motivated, experienced, and with an a priori cohesion as a group. However, although several people filed meaningful proposals (MITROPOULOS, 1997b), these were not nationally backed up, and the Council of Europe proved unwilling to draw on its own splendid record of the 1970s on the innovative use of information/communications for cultural and social-oriented goals (I pulled out in July 1988). However, one can learn a lot from the relatively successful governance of outer space, as a new space (von der WEID, 1992). To give a specific example regarding policy (without going into any detail), I can refer to the lack of policy for isolated human settlements in Greece: myself focusing on islands (the other kind of isolated human settlements being mountaintops), by policy I mean the provision of services-at-a-distance for medical diagnosis and treatment, education, administration and cultural profile. Finally, I can add that just prior to our WSE meetings at the Wissenschaftszentrum Berlin, there was another Berlin congress on Innovations for an E-Society (Institute of Technical Assessment). One of the items to have been tackled (besides E-commerce, Vulnerability, Health Services, etc.) was Electronic governance.

• Regarding Rae's question, the quality of Physical space as an issue finds me in full agreement. In the face of Electronic space as an alternative or even substitute for Physical space, the issue has not been addressed, mainly because people who organize space (especially those who teach) do not consider Electronic space as part of the Behavioral space they themselves live in, of the city they live in. One can go even further and say that the same goes for interpersonal relationships. We should note that Electronic space, besides being economically affordable and technically accessible, also provides for anonymity. But besides deviant behavior, cyberpsychologists recording addictive sexual behavior in Electronic space stop short of asking the question relating to the quality of sexual contentment in Physical space. After all, if your girlfriend in the physical world is blooming, why search for an electronic one?

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The economic impact of a major airport

Margery al Chalabi

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Introduction

The economic impact of aviation became all too apparent in the weeks that followed the attack on the World Trade Center, in New York, and on the Pentagon, in the nation's capital (table 1). More than 125,000 air carrier jobs were eliminated almost overnight; nearly 100,000 of these jobs were at American airlines, approximately 14 percent of the industry's total work force. Four to five times that many are expected to lose jobs in the businesses and industries that depend on air transport. With its 30,000 loss, Boeing is a good example of the 100,000 jobs that could be lost in manufacturing, alone.

A quick infusion of $15 billion was approved by the U.S. government to stabilize the industry. However, shock waves continue to reverberate throughout the world's aviation community. And the travel industry is profoundly shaken.

The most dramatic impacts are being imposed on those cities that are major centers of air travel (aviation hubs and business centers) and travel/tourism sites and industries. Chicago, Atlanta, Denver and Dallas are prime examples of the first factor; Orlando, Las Vegas, San Francisco and Miami are examples of the second. The impact on the economies of the 40 largest economic areas in the U.S. is estimated at $129 billion, a 2.47 percent decrease from the expected 2001-2002 growth. This estimate, by the firm Economy.com, was reported in the 9/30/2001 edition of the *New York Times* (table 2).

It will take some time to recover from this multiple assault on the economy. But the fundamental, underlying growth factors remain strong:

- a vibrant U.S. economy, based on entrepreneurship;
- a widening and more-interlinked global economy;
- a greater demand for multi-component goods from across the globe for manufactures and services;
- an increased standard of living and quality of life for large segments of the world;
- a heightened sensitivity to the growing gaps between haves and have nots; and,
- a willingness to share the wealth.

With this as a preface, we can begin to address the more-normal economic impacts of the aviation network and its major airports.

Table 1
The September 11, 2001 attack – Adverse economic impacts on aviation and job losses

Worldwide Aviation Job Losses	125,000
American Airline Losses	100,000
Percent of U.S. Airline Jobs	14 %
Losses in Related Industries	500,000
Losses in Manufacture	100,000
(Boeing losses)	30,000

(Sources: Aviation Week and Space Technology, 10/1/01; *New York Times,* 9/30/01).

Table 2
The September 11, 2001 attack – Forecasted impacts on U.S. metropolitan areas (dollar losses)

City	Economic Loss (2001-02)
New York	$ 14.2 Billion
Los Angeles	$ 8.94 Billion
Chicago	$ 9.65 Billion
Boston	$ 8.03 Billion
Dallas	$ 5.13 Billion
Atlanta	$ 5.54 Billion
San Francisco	$ 4.04 Billion

(Sources: Economy.com, *New York Times,* 9/30/01; ACG: The al Chalabi Group, Ltd).

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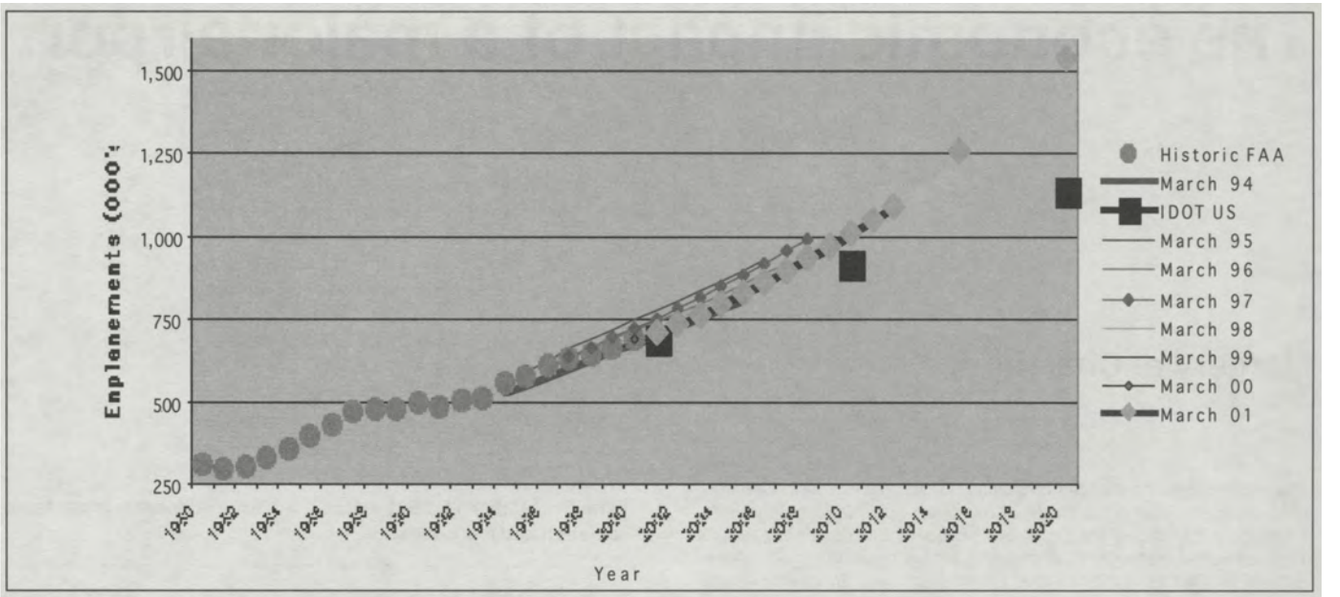

Fig. 1: U.S. total enplanement forecasts. (*Source:* Federal Aviation Administration – FAA).

Impacts of globalization

Aviation is now truly a mass transportation medium. Since 1980, air passenger traffic has doubled every 15-20 years. In 1980, there were 312 million enplanements in the U.S.; in 1990, there were 498 million; in 2000, 694 million; in 2010, over one billion are expected; and by 2020, the forecast is for 1.5 billion (fig. 1).

The aviation growth for North America (2000-2020) is 3.1 percent per year. While this growth is significant, the growth expected in Europe is even greater, 4.7 percent per year. Trans-Atlantic demand is expected to grow by 3.6 percent per year. These are the three largest of 12 regional demands worldwide. The remaining nine regions, while smaller, are all expected to grow at higher rates – from 4.7 to 7.7 percent, in Africa and Latin America, respectively (fig. 2).

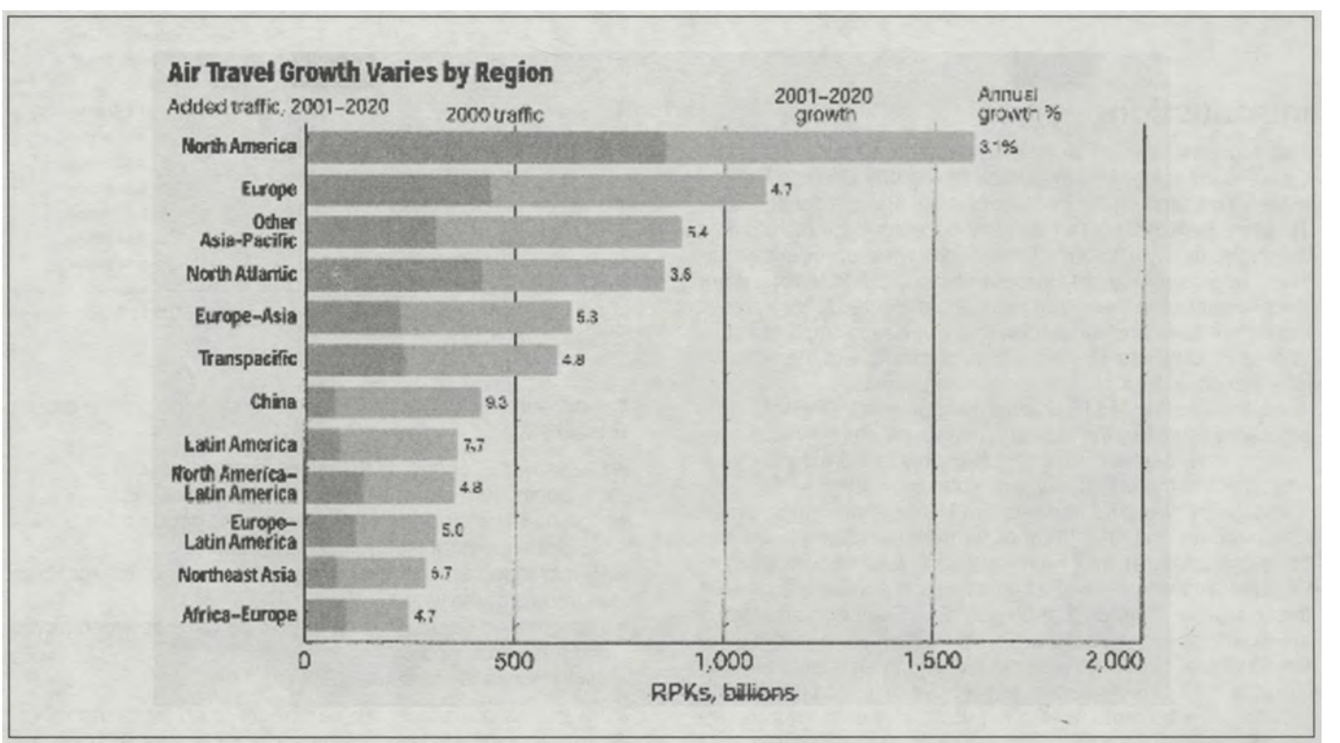

Fig. 2: Expected aviation growth, 2000-2020. (*Source:* Boeing, *Current Market Outlook*, 2001).

In spite of these dramatic demands only a few major airports actually have been built over the same period. Only one airport, Denver, has been built since 1974 in the USA. A few – Pittsburgh, Washington National – have been rebuilt. Only a few in Europe – Malpensa, Athens, Stansted and Munich – have been built in that same time. Most new facilities have been constructed in Southeast Asia; and many of these – Chek Lap Kok, Kansai, Inchon, Kuala Lumpur, Bangkok – have been constructed as small cities. In many ways, they are the new downtowns.

Aviation a significant part of the economy

Throughout the developed countries of the world – and certainly within the USA – aviation is a significant part of the national and regional economies. Travel and tourism is a nearly $1 trillion business in the USA. It is a substantial part of most European economies, as well. Air travel is a major and growing component of that economic sector.

Air transport's share of international trade is growing even more rapidly than global trade, itself. For instance, the average computer requires numerous parts from many countries prior to final assembly. The computer chip, itself, travels six times by air before being placed in the computer. Air cargo is growing at rates $1^1/_2$ times that of passenger growth, more than tripling in the next 20 years. It will require all-cargo aircraft and major distribution facilities and networks around the airport. In many cases, it has spawned new just-in-time industries at the airport and has reinvigorated old economies. UPS, at Louisville Airport, is one such example, spurring a significant job growth – nearly 17,000 – in 10 years. In so doing, Louisville Airport rose in rank from #11 to #3 in air cargo in the USA.

Currently, aviation (excluding manufacture) comprises 4 percent of the GDP; it is expected to grow to 6 percent by 2020. In some American cities, where aviation is particularly critical (Chicago, New York, Atlanta, Los Angeles, Miami), aviation comprises 5 percent or more of the regional economy and will grow to 7.5 to 9.0 percent by 2020. Chicago is one such region where aviation is a major and growing part of the economy.

Airports as economic engines

Major airports have been characterized, very correctly, as economic engines. Airports such as O'Hare, LAX (Los Angeles), La Guardia, San Francisco, Atlanta, Dallas-Fort Worth, and Miami have generated $15-$30 billion, annually, for their regions. Heathrow, Frankfurt, De Gaulle produce similar bounties for their regional and national economies.

The economic magnetism of a major airport can be seen in the growth patterns of the Chicago region between 1960 and 1996 (fig. 3). These dates are when O'Hare Airport opened and reached capacity. Massive economic development, including new industries and expanded employment, has clustered around the airport. By 1990, with 600,000 jobs, there were more jobs clustered around O'Hare Airport than in the Chicago Central Area, with 500,000.

- **Direct jobs at airports:** The al Chalabi Group has been studying airport economic impacts since 1985. The first step in the analysis was to determine the direct job impact of airports. Based on economic impact reports prepared for or by 40 airports and enplanement data collected from the U.S. Department of Transportation, Federal Aviation Administration, ACG was able to develop a model that estimated and could forecast direct employment at major airports.

Direct jobs are airline and air service jobs plus government jobs at the airport. Different types of enplanements – origin/destination (O/D), connecting and international – create differ-

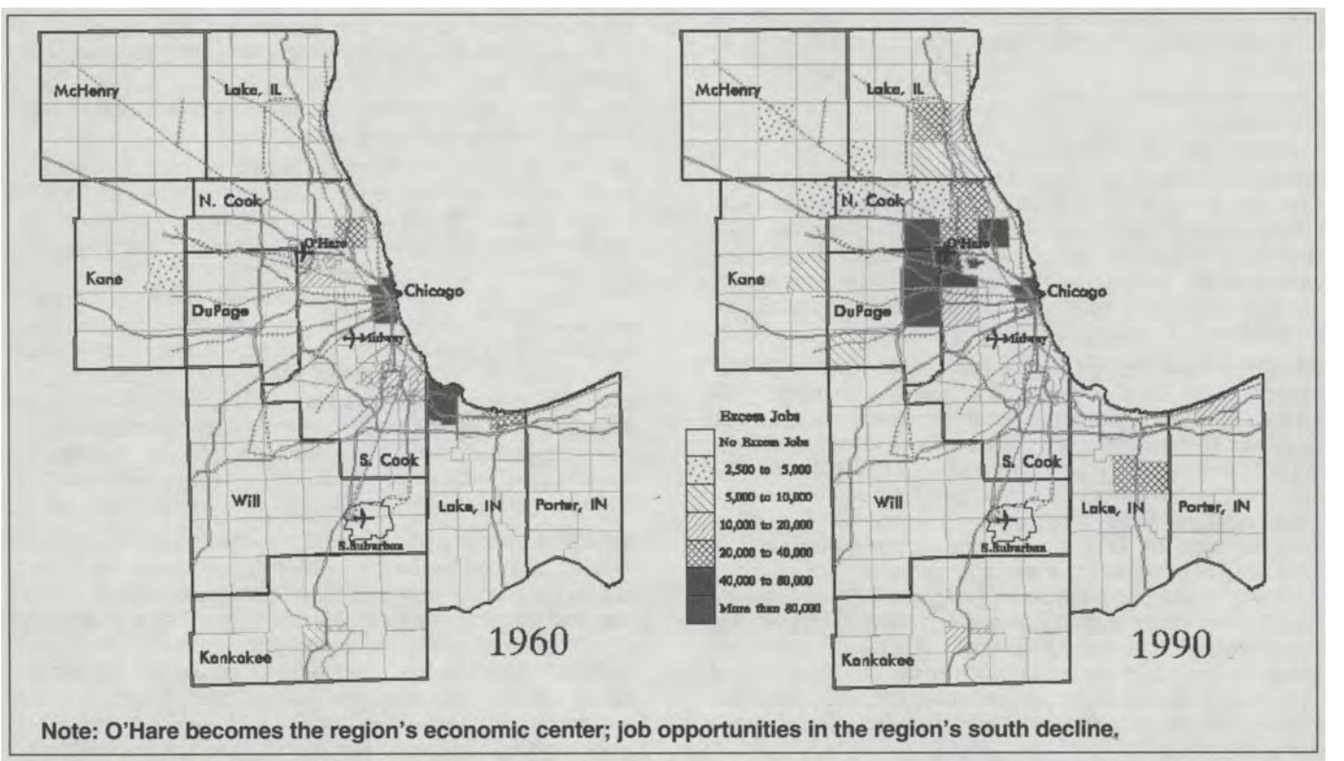

Fig. 3: Job migration in the Chicago region – 1960 to 1990.

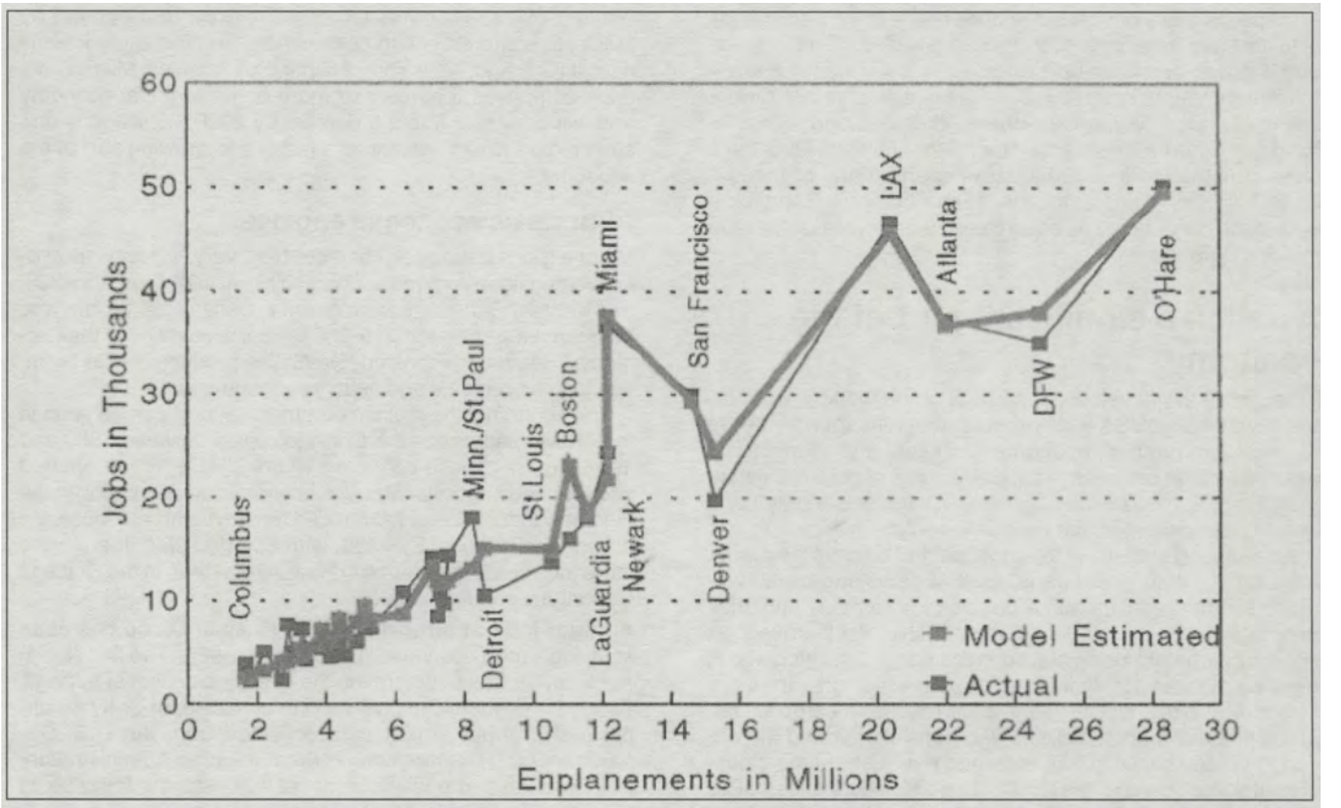

Fig. 4: Airports as economic engines – Direct jobs at airports. (*Source:* ACG Forecast Model).

ent levels of jobs, with international creating more than $3^1/_2$ times the number produced by domestic O/D. Connecting enplanements produce numbers slightly lower than O/D. The jobs created per one million enplanements, in 1990 (fig. 4), were:

- origin/destination - 1,529
- connecting - 1,348
- international - 5,459

The airline industry is one of the most productive in the U.S. Consequently, productivity improvements are expected to reduce these rates, shown above, by 2020. However, even with these reductions, direct jobs generated by aviation are considerable. At the adjusted rates and 2020's enplanements, nearly 2.0 million direct jobs would be produced at U.S. airports (fig. 4).

• **Indirect jobs:** Indirect jobs are those generated by visitor expenditures. They include jobs at hotels, convention facilities, visitor attractions, retail, local transportation, food and beverage, entertainment, etc. The best way to measure these impacts is to conduct air visitor surveys and calculate the amount spent by each domestic and international visitor. These amounts need to be corroborated, however, by other sources, such as hotel occupancies and receipts and data from national travel and tourism organizations.

Models developed by ACG in 1990 and 1995 indicate increased impacts in spite of increased productivity (fig. 5). For every direct job, one indirect job will be produced. As international visitors comprise larger ratios of the total, the ratio of indirect to direct jobs also will increase; this is because the international visitor spends $1^1/_2$ times as much per day as the domestic visitor.

Our studies indicate that an airport with approximately 30 million enplanements would generate approximately $3.4 billion in visitor expenditures (in 1994 $s).

• **Induced jobs:** Induced jobs are the multiplier effect on the economy of both direct and indirect jobs. They consist of two major categories:

- suppliers to the industries previously mentioned; and,
- jobs created by the wages spent.

The first category includes such factors as linen suppliers to hotels, uniform suppliers to flight attendants and fuel and equipment suppliers to the airlines. Examples of the second are the cars and groceries purchased and services required by the airline, hotel and other employees.

Induced jobs produced by indirect jobs are fairly modest; they are 0.6 induced for every indirect. However, induced jobs created by the direct transportation jobs are considerable; they are 1.6 induced for every direct. Multipliers are different for each region and increase as the region grows and becomes more economically diverse. However, the transportation industry – cars and aircraft, for example – creates vast numbers of induced jobs. In Chicago, the aviation and auto industries had multipliers of 6.65, indicating that they were basic industries.

• **Adding up the jobs:** In addition to the direct, indirect and induced jobs created by the aviation industry itself, the airport and its access to the world becomes an inducement to industries and jobs that require that access (fig. 6). The greater the number of destinations, the greater the attraction of the airport and the region it serves. Furthermore, the income generated by the taxes to municipalities is often used to enhance the travel/tourism/headquarters appeal of the region – with hotel taxes building convention centers, for instance, and with corporate donations to concert halls and museums.

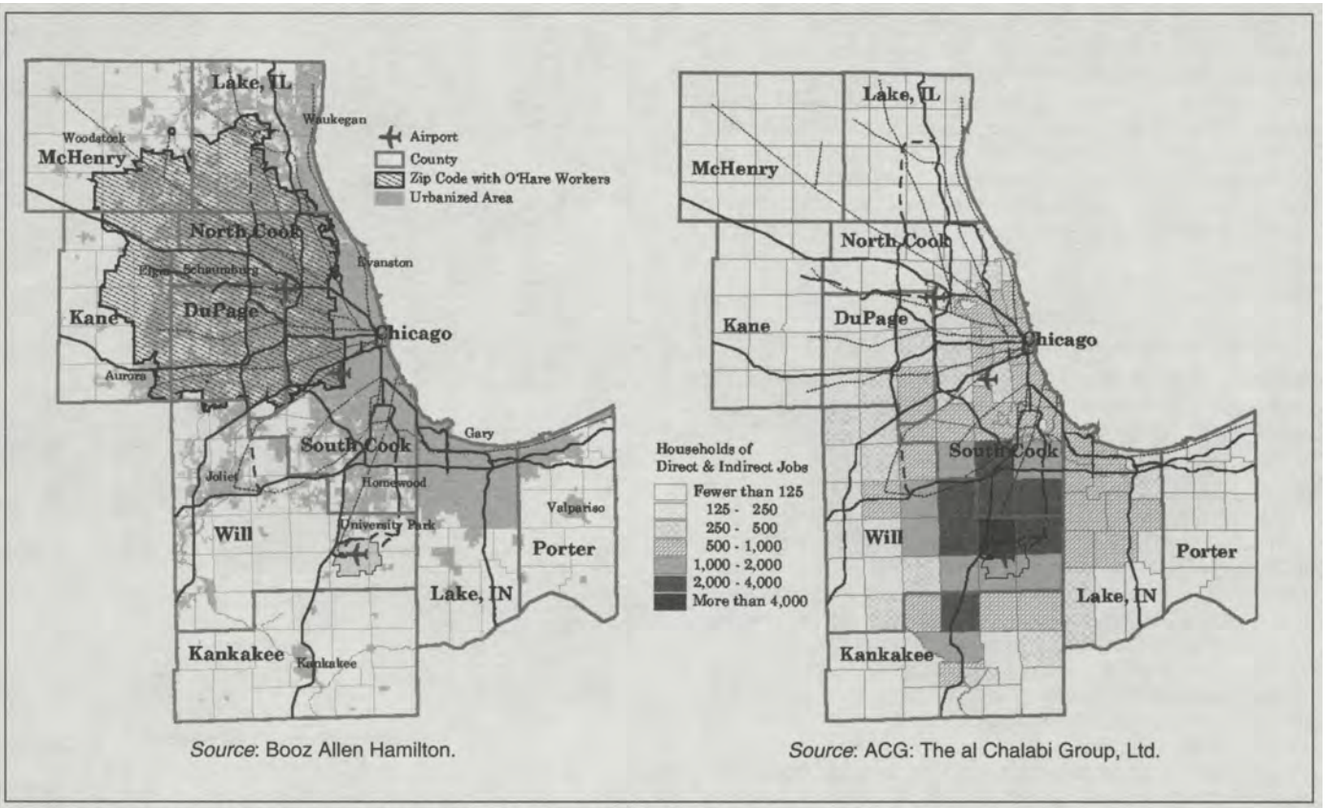

Fig. 5: O'Hare employees reside around it – The South Suburban Airport provides similar opportunities.

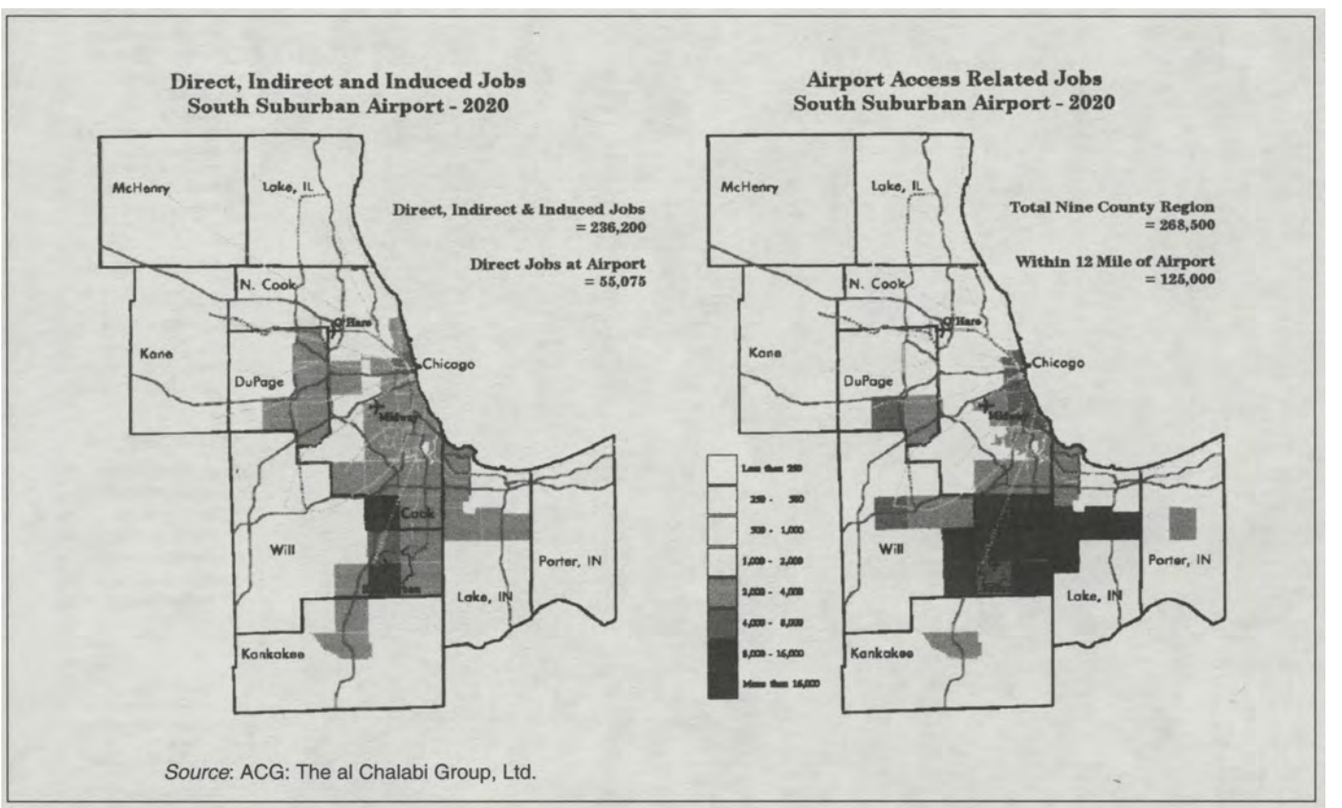

Fig. 6: Airports are economic engines – The economic impacts of the South Suburban Airport would be many and widespread.

Finally, the area around a major airport takes time to mature, with time measured in decades. But, eventually, the airport can become the region's primary or secondary employment focus, attracting hundreds of thousands of jobs. ACG looked at this impact from its reverse – estimating those jobs that would be lost or foregone if a region did not build sufficient aviation capacity to adequately service its projected population and job growth (fig. 7). We were able to estimate both the job impacts and other effects on the regional economy, including:

- job losses;
- fare increases;
- loss of access/competitiveness; and,
- sub-regional tax impacts (as remote areas lose jobs).

We found that, if it did not build the South Suburban Airport to increase its capacity to meet expected growth, the region would lose or forego 500,000 jobs by 2020.

Environmental impacts

Throughout the USA, as in much of Europe, we are concerned about the environmental impact of any major project. Consequently, all Federally-funded projects must undergo extensive environmental impact analysis. In the case of airport development (new airports, added runways, terminals) the time requirements are great – often consuming 10-15 years. This process protects the environment, but allows the problem to grow while the solution is being processed.

In the case of Chicago, a third airport has been under study for over 15 years and land acquisition finally has begun. But aviation growth in the region has been at a virtual standstill since 1995, when practical capacity was reached. In addition, more and more regions are reaching aviation capacity. Con-

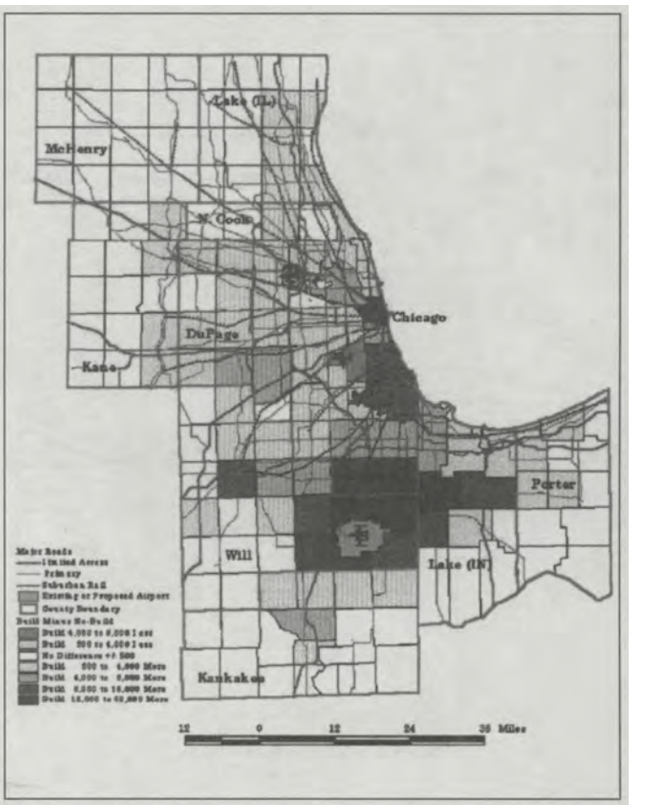

Fig. 7: Job impacts of building versus not building an airport – 2020 (build minus no-build).

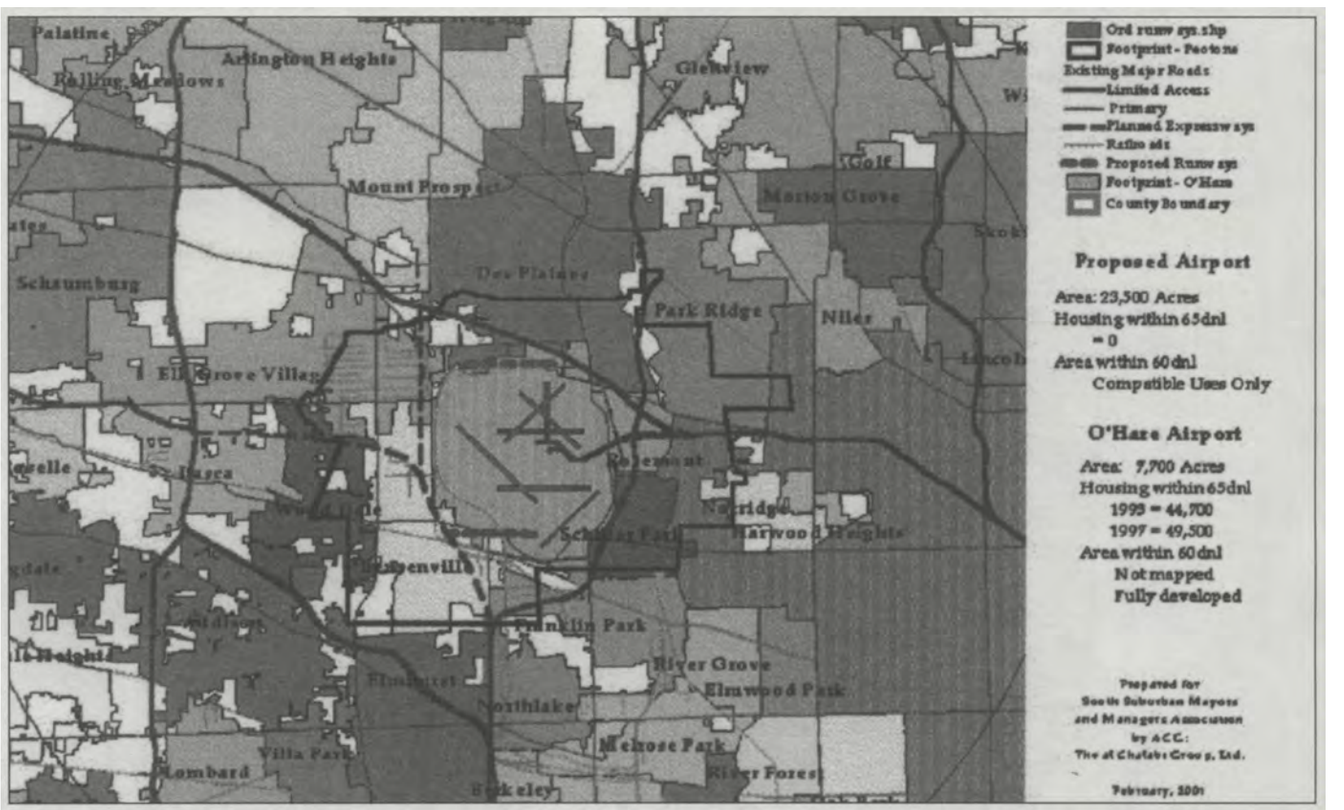

Fig. 8: Environmentally, South Suburban is well planned, unlike O'Hare – All objectionable noise and pollution is within the 23,500 acre site.

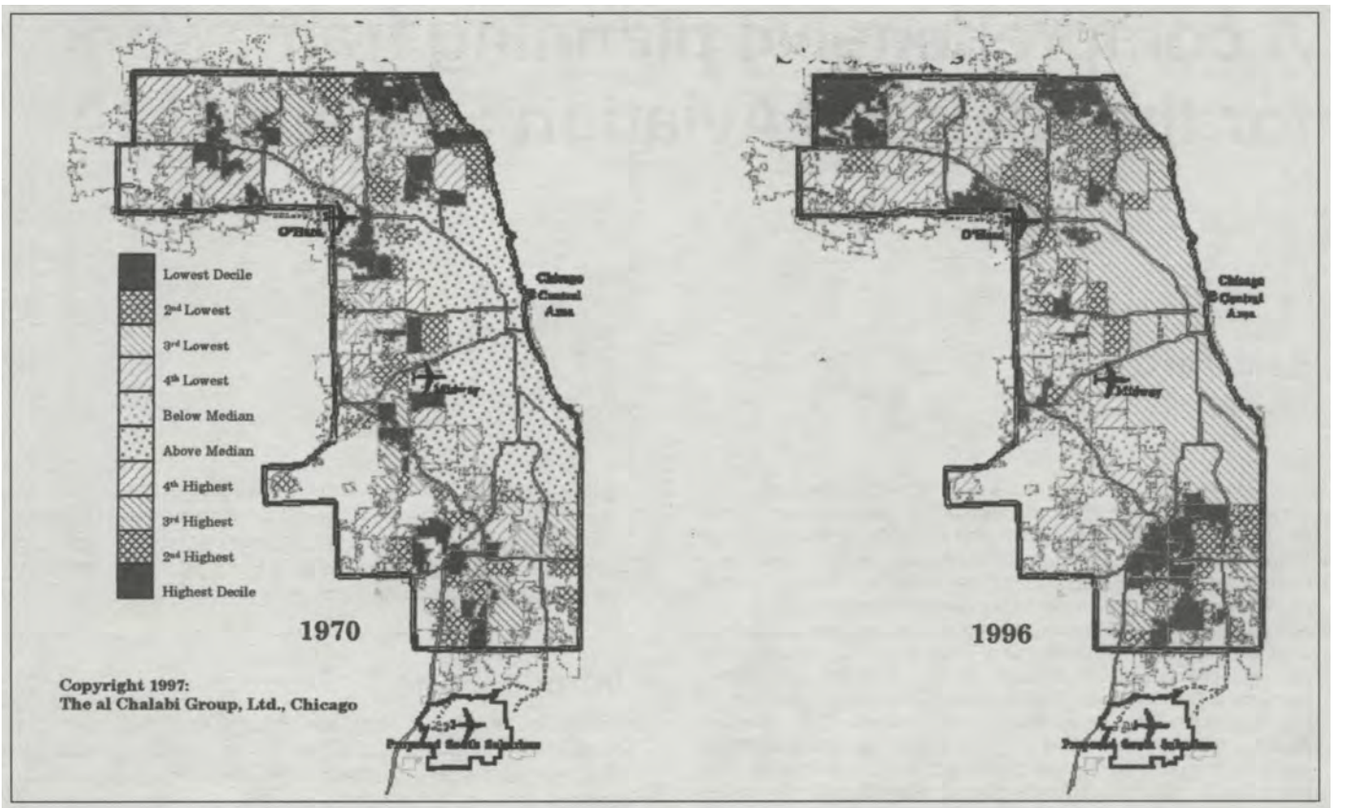

Fig. 9: The significant impacts of airports on real estate taxes – The O'Hare impacts on Cook County in 1970 and 1996: The North prospers, the South pays.

sequently, these time-consuming requirements need to be refined before they further exacerbate the problems. We need to protect our citizens as well as the flora and fauna of the region.

Construction of new facilities not only can reduce congestion, but can best accommodate the changing requirements of aviation, as well as provide the spatial buffers needed to contain adverse noise, air and water impacts. For instance, a parallel runway layout for the South Suburban Airport greatly increases its capacity over that of the intersecting runways of O'Hare Airport. Furthermore, the footprint of the proposed South Suburban Airport, superimposed on the existing O'Hare Airport, contains all of the latter's adverse noise impacts (over 65 Dnl) (fig. 8).

Finally, major airports, such as the proposed South Suburban Airport, can be used as a mechanism for balancing or rebalancing a region's economy. In the case of the South Suburban, it will provide a third growth focus for the region, replacing the employment facilities lost during the late 1960s; it will bring jobs closer to those who must now commute long distances; and it will generate tax revenues for cash-starved municipalities. Currently, those areas farthest from O'Hare suffer (fig. 9).

Conclusion

Building a third airport to serve the Chicago Metropolitan Area will be a major asset to the regional economy. It will accomplish the following:

- It will permit the forecasted population and jobs to materialize.
- It will provide additional jobs, income and revenues to those portions of the region in greatest need.
- It will help to re-establish economic balance to the region.
- It will contain adverse environmental impacts on site.
- It will reduce highway traffic and congestion as people find jobs and airport access closer to their residences.

In all respects, the construction of a major third airport for Chicago is a win/win solution.

A comprehensive planning framework for the National Aviation System, USA

Suhail al Chalabi

The author, Vice-President of the al Chalabi Group (ACG), Ltd., Chicago, USA, is an architect, graduate of the Massachusetts Institute of Technology, Cambridge, MA, and of the Graduate School of Ekistics of the Athens Technological Institute, Greece, and also a member of the World Society for Ekistics (WSE). He has over 30 years of experience as a regional planner and transportation planner; he served in several state, city and regional government positions in the USA and, prior to joining the al Chalabi Group, he was Commissioner of Economic Development for the City of Chicago. For ten years the al Chalabi Group has been actively involved in all aspects of planning for the Third Airport for the Chicago region. They have conducted aviation and demographic forecasts; estimated socio-economic and development impacts; and coordinated ground transportation improvement for this 5 billion dollar project. The text that follows was distributed to the participants at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001, which the author was finally unable to attend.

Preface

A document with the ideas included in this paper originally was prepared as part of a call for papers, "Writing the Wrongs," compiled by The Women's Transportation Seminar (WTS). The compilation was completed in May 2001 for presentation to the newly-confirmed U.S. Secretary of Transportation, Norman Y. Mineta, to assist in an agenda for national transportation policy initiatives.

In September 2001, as an aftermath of the air attacks on New York and Washington, DC, air carrier operations in the U.S. have been reduced by 20 percent, across the board; and passenger enplanements have fallen considerably below the 70-75 percent load levels of the past five years.

Industry experts expect a rebound in air traffic over the coming 12 to 18 months; and believe that it will catch up with former and forecasted levels. However, much has changed. At the very least, more attention will be paid to security; and airport design must incorporate such precautions. This will require new facilities; and, in the interim, lengthy wait-times may discourage short-haul and discretionary traffic. New air traffic modes, methods and supplements may emerge. Such factors as fractional ownership in private jets may gain appeal to corporations and the wealthy. Supplemental luggage transportation may gain favor. And new screening technologies will be developed. In the long-term, however, problems will be identified and solved to allow the world to continue to fly.

Introduction

For the better part of a decade, federal and local planners, business and industry groups, airport sponsors, presidential and Congressional commissions have predicted the aviation gridlock currently crippling the country. Secretary Norman Y. Mineta chaired one of the latter, the National Civil Aviation Review Commission, which, in December 1997, issued its unequivocal warning, "Airport needs are not being met...our nation's aviation system will succumb to gridlock." Outcries have been loud and rife as the predicted capacity crunch recently took its toll on individual airports and the national aviation system.

Over the past two years, travelers have faced historic delays, cancellations and higher fares. Flights are so full that passengers bumped from a cancelled flight often cannot book a substitute flight for days. The business traveler cannot rely on an early-morning flight to arrive on time and must arrange an overnight trip, adding cost to an already costly business fare. The leisure traveler (contributor to a half trillion dollar national business) is relegated to a middle seat on many flights, as load factors exceed historic highs.

The business community, transportation planners, local officials and Congress have been concerned about many of these problems: lack of competition, higher fares, loss of service, delay and capacity constraints. These concerns have resulted in the initiation, then increase, of Passenger Facility Charges (PFCs) and the tripling of funds to address the problem. This is one of those rare instances where funding is not the problem. Lack of vision and political will, an unwillingness to acknowledge need in fear of community opposition, and attempts to control large market share of the industry, are. These are formidable obstacles.

The public, however, is demanding solutions, and demanding them now. Because the needed airports and runways are not in place, and aviation forecasts for this summer are strong, new short-term solutions are being sought. The solution being touted is congestion pricing: to distribute flights more evenly throughout the day; or to dampen demand. But a more permanent and long-term solution to this urgent problem is needed. This paper proposes an approach to such a solution.

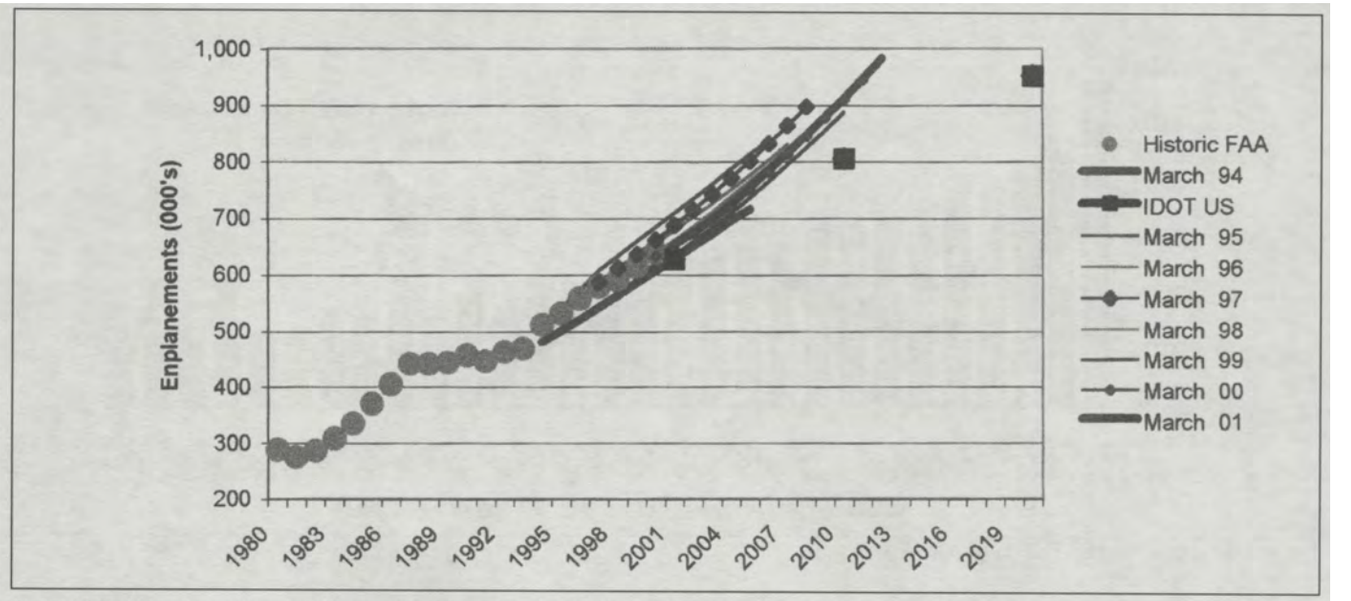

Fig. 1: U.S. domestic enplanement forecasts. (*Source:* Federal Aviation Administration – FAA).

The problem

The problem with the nation's aviation system is both obvious and simple. The national aviation demand is doubling every 15-20 years. The country is richer, its citizens more prosperous, and its economy more global. In spite of prodigious past development and forecasted aviation growth, only one new airport has been built since 1974. Few new runways have been built and almost all of the largest hub airports are at capacity and landlocked. In 1980, there were 312 million enplanements in the U.S.; in 1990, there were 498 million; in 2000, 694 million; and, in 2010 over one billion are expected. The Federal Aviation Administration (FAA) has forecast this demand accurately (fig. 1). Unfortunately, there has been no corresponding effort to build the new airports or runways to accommodate this demand.

The main problem is a disconnect between national and regional forecasts (fig. 2).

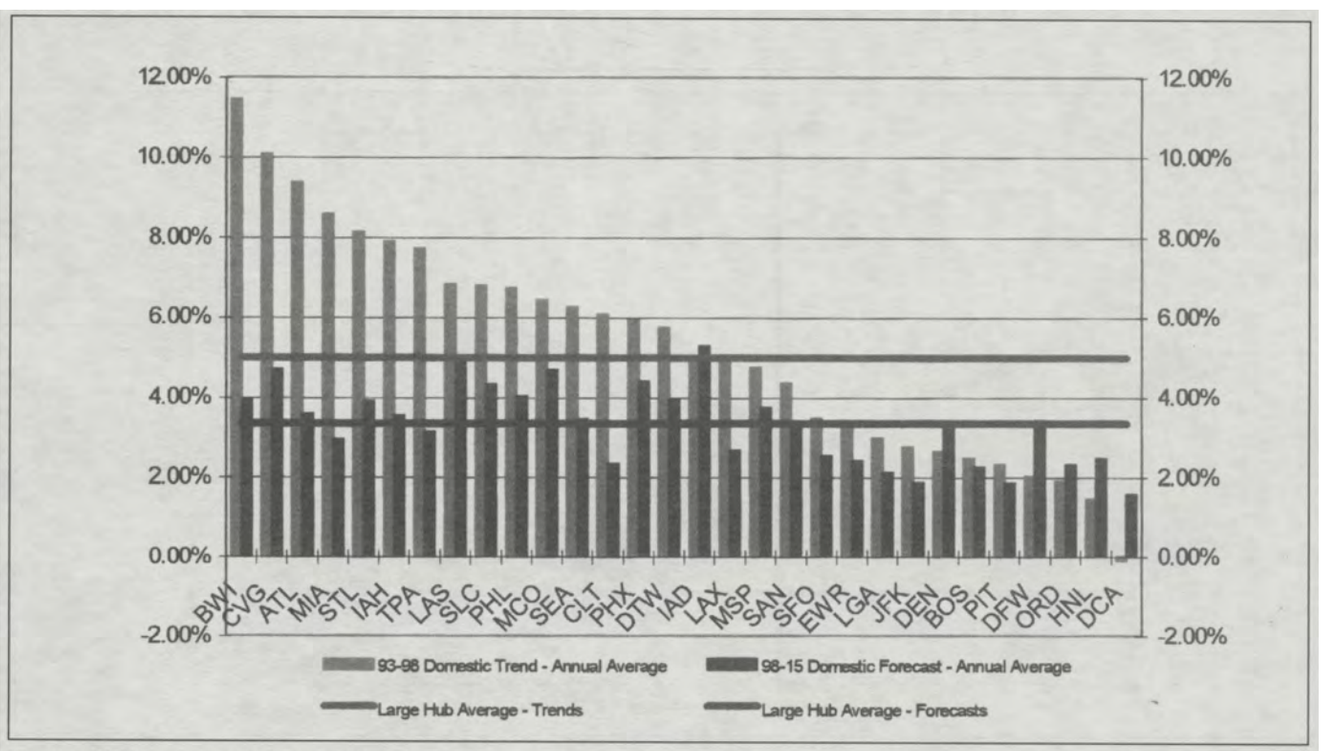

Fig. 2: USA – Trends and forecasts at large hubs.

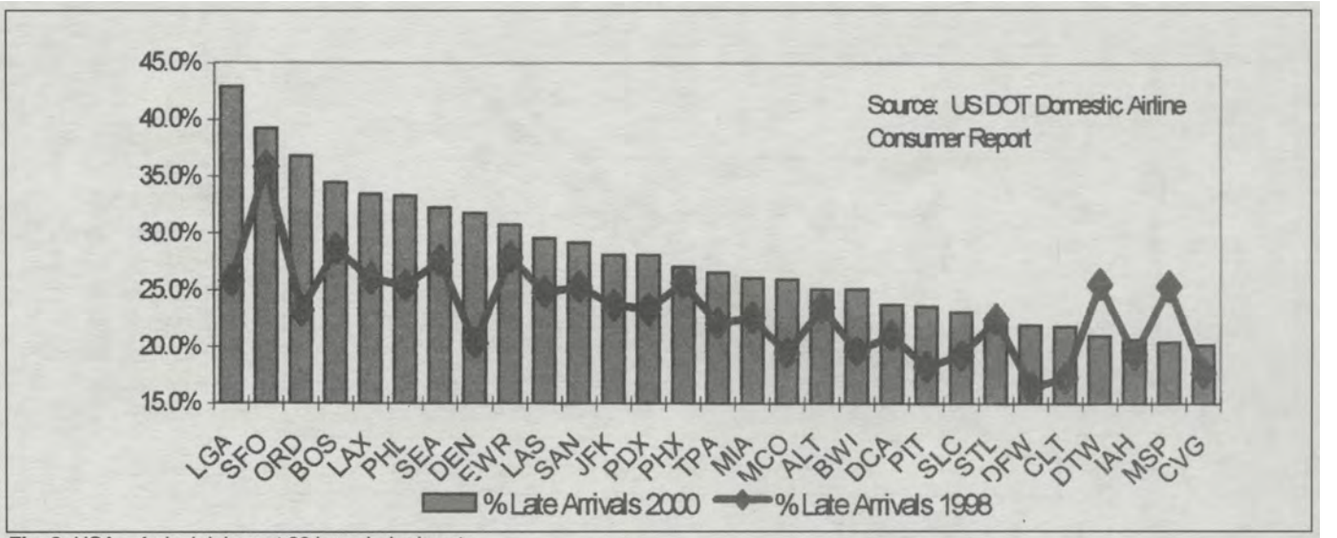

Fig. 3: USA – Arrival delays at 29 large hub airports.

• Regional forecasts are based on extrapolation of very recent past trends at existing airports. This has the perverse effect of showing constrained airports – those with the greatest demand – at low forecast levels. Airlines are willing subscribers to these low forecasts, claiming them as the products of mature markets.

• This process, however, completely ignores real regional demand, specifically, the need for additional airports. There appears to be no direct connection between forecasted need at the national level and concrete plans to increase capacity where it is needed.

In spite of the fact that the nation has been spreading outward into more-expansive suburbs and regions, most airports remain in center cities – built to early aviation standards and almost totally landlocked. Expansions are both costly and difficult; adverse impacts at many would be felt by thousands – sometimes hundreds of thousands – of nearby residents. The result is overtaxed facilities and – with the slightest weather or operational problems – major delays. In 2000, over one-quarter of all flights at the nation's large and medium hub airports were delayed more than 15 minutes; and 50 percent of the delays were contributed by the five most-constrained airports. While weather was claimed as the culprit, constrained capacity was the real villain (fig. 3).

The fact that the nation's busiest airports are also the most constrained allows fares at them to rise sharply. Part of the fare increase is intended to dampen demand. But, all too often, maximizing airline profit is the main intent (fig. 4). When

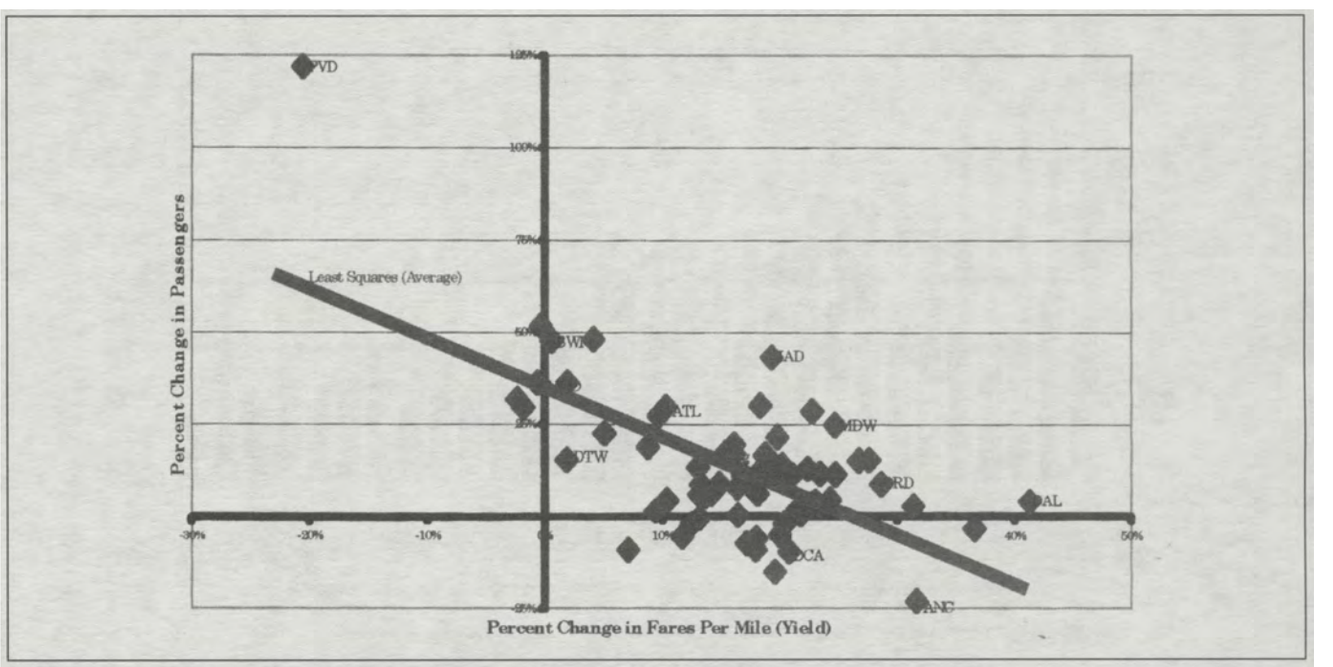

Fig. 4: USA – Fare increases vs. passenger growth at constrained airports, 1995-1999.

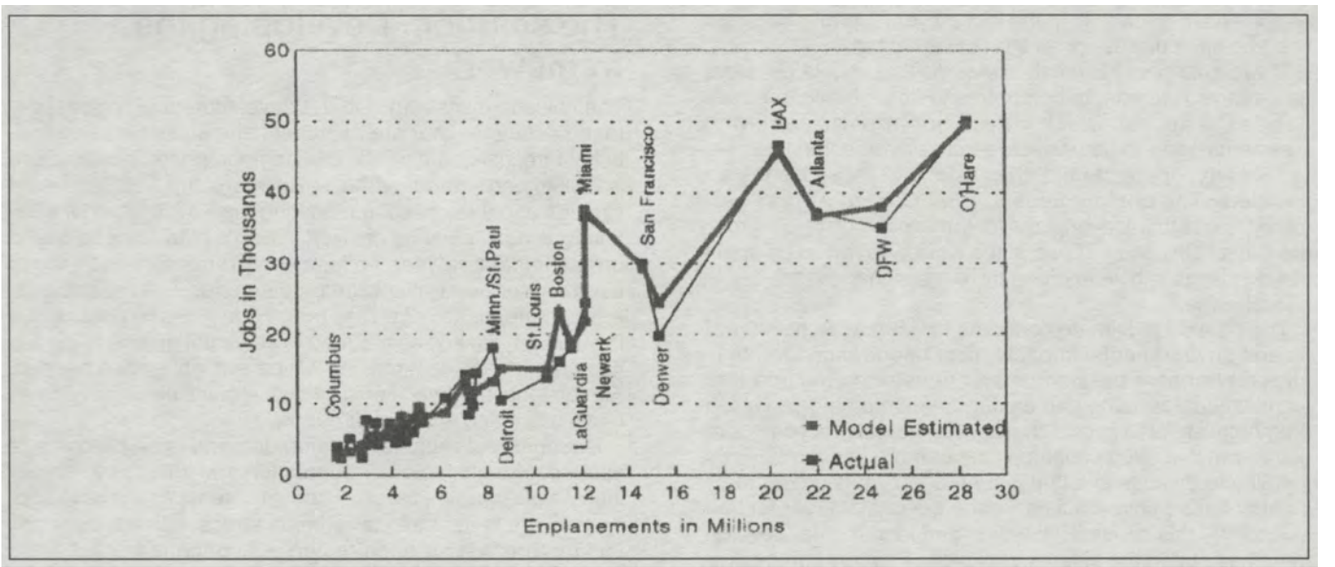

Fig. 5: Airports as economic engines – Direct jobs at airports. (*Source:* ACG Forecast Model).

approximately 80 percent of the nation's job growth comes from entrepreneurs and small businesses, such excessive costs can severely constrict the economy.

Major airports have been characterized, very correctly, as economic engines (fig. 5). Airports such as O'Hare, LAX, JFK, LaGuardia, San Francisco, Atlanta, Dallas-Fort Worth and Miami, generate $15-$30 billion, annually, for their regions. Capacity constraints can make it difficult for these mature urban areas to compete for new businesses and industries. The aviation industry provided four percent of the nation's jobs and six percent of its GNP in 1996. By 2020, these percentages will be seven and ten percent, respectively, with even greater ratios in hub-cities. With its major job and financial centers artificially constrained, it is difficult for the United States to compete in the global market place.

In its February 1990 report, *Current Market Outlook*, Boeing forecasted Year-2000 airport runway shortfalls, based on runway capacity and forecasted traffic (fig. 6). Boeing was right. These airports now are at capacity and the cities/regions they serve are at risk. This comes as no surprise to anyone who has been involved in airport planning. Perhaps because these warnings angered airport authorities, both Boeing and the FAA stopped identifying constrained airports the next year. A long-promised FAA assessment of capacity thresholds at major airports was released April 25, 2001, confirming much of what air travelers knew and Boeing foretold.

Why the problem has grown and continues growing

The aviation industry and planning for it are complex, filled with arcane terminology and standards that vary by reporting source. Because no new airport and few runways at existing

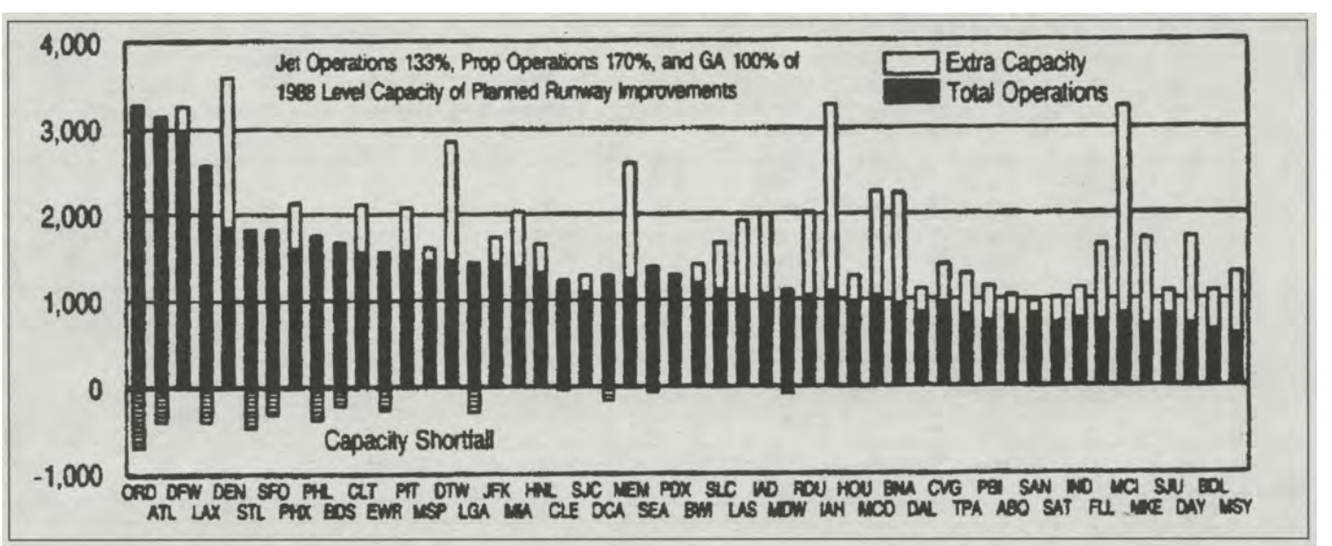

Fig. 6: Airport runway capacity – Boeing year 2000 forecast.

airports have been built in the last 20 years, public participation and open discussion in this field is limited.

There are many legitimate concerns that should be debated openly. A region, to compete and flourish economically, needs the access which only major airports can bring. Residents need to be protected from adverse impacts. Unfortunately, open, candid discussions of these issues are avoided. The communities around O'Hare Airport were forced to sue to uncover plans for the expansion of O'Hare by the City of Chicago. These plans were disavowed as unofficial doodlings and were promptly re-consigned to the vault by a local judge.

The public's legitimate concerns for increased noise, traffic and environmental impacts have been responded to by airport sponsors breaking major developments into their smallest components and easing them into being. This incrementalism also avoids the environmental process – a requirement that often consumes ten or more years. While the inability to discuss aviation issues openly has vexed many planners and public officials – even the wiley Mayor Richard M. Daley – this componentization and incremental development has suited the airlines very well. Fiercely competitive, the airlines have created and embellished strong fortress hubs; they have developed tacit agreements among themselves not to encroach upon established routes and markets; they have fought new airports since 1927. Improvements that are meted out to avoid discussion, opposition and environmental review, accommodate well the expansion schedules of individual incumbent airlines. This development process (or lack of it) has bred skepticism and concern among the public.

The national aviation network, in reality, is a collection of fiefdoms, which plan only for their own markets and holdings. Because serving fewer high-fare paying patrons is more profitable than serving larger numbers of lower-fare patrons, the smallest expansions suit the financial objectives of the airlines. Consequently, the total of proposed improvements scheduled at all airports falls far short of accommodating the forecasted aviation demand for 2010 or beyond (table 1). Furthermore, no runway additions are proposed at many of the most congested airports, including five of the top ten with the highest levels of delay (table 1). And, large segments of the market remain unserved.

The solution: Developing the framework

The solution must start with the development of regional demand estimates that are as honest and accurate as the national forecasts; and to see that an appropriate infrastructure is built to accommodate them. An integrated national airport system, capable of accommodating the FAA's national aviation forecasts, must be devised. Such a plan must be based on technical analyses no less comprehensive than those used for surface transportation planning. The federal government needs to formulate pragmatic plans to ensure that the aviation capacities required to serve the growth of the nation and its individual regions will be available when needed. For too long, the needs of individual regions either have been badly estimated, ignored or opposed.

National and regional aviation demand is an outcome of socio-economic factors – population and job growth, family income and wealth, industry and service types in the region. As they are in the national aviation forecast, these demands can be forecast for each region or economic market area. The region, however, is more than the sum of its airport demands, particularly if one or more of that region's airports is at or near capacity.

When regional demand is not accommodated – whether airports are at capacity or too far distant – demand for long-distance travel is satisfied by another, more-accessible mode. This transfer is likely to be to the auto. The result of this transfer (slow or no growth) often is attributed to the region's mature market. This is wrong. ACG estimates that, by 2000, the Chicago region had lost or foregone 3.1 million domestic enplanements due to capacity constraints (fig. 7). The loss would have been greater, but Midway's extraordinary growth partially compensated for O'Hare Airport's losses. The 2001 forecast for the Third Airport for Chicago, made in 1994, was 7.1 million enplanements. Had it been built, many national delay problems could have been avoided; and the Chicago region would have been 23,000 jobs richer.

By examining local economics and devising local aviation forecasts that parallel national ones, the planner can get a more accurate estimate of demand than by accepting or extrapolating local airport data. As a general rule, the forecast

Table 1
Airports ranked by delay/proposed improvements, USA

Rank	ID	Total Ops	Total Delays	Delays per 1,000 OPS	Average Time (Min)	CY 99 Enplanements	% of Total Enplanements	Planned Runway Projects through 2005
1	ORD	897,290	49,202	54.83	55.83	34,050,083	5%	No Projects Planned
2	EWR	463,000	36,553	78.94	49.98	16,927,048	3%	Runway Extension
3	ATL	909,911	32,737	35.97	37.67	38,136,866	6%	New Runway
4	LGA	368,311	28,474	77.3	39.95	11,968,030	2%	No Projects Planned
5	SFO	440,032	21,187	48.14	52.96	19,249,988	3%	No Projects Planned
6	DFW	867,338	16,731	19.29	38.7	27,990,212	4%	3 Runway Extensions;1 New Runway
7	BOS	502,164	14,989	29.84	43.96	15,375,183	2%	New GA Runway
8	PHL	480,279	14,516	30.22	45.25	13,183,145	2%	No Projects Planned
9	JFK	355,677	13,547	38.08	36.44	11,762,140	2%	No Projects Planned
10	PHX	563,843	11,919	21.13	27.11	16,781,835	3%	New Runway; Runway Extension
Total		**5,847,845**	**239,855**			**205,424,530**	**31%**	
Total average				**43.38**	**42.79**			

(*Source*: 2000 Aviation Capacity Enhancement Plans).

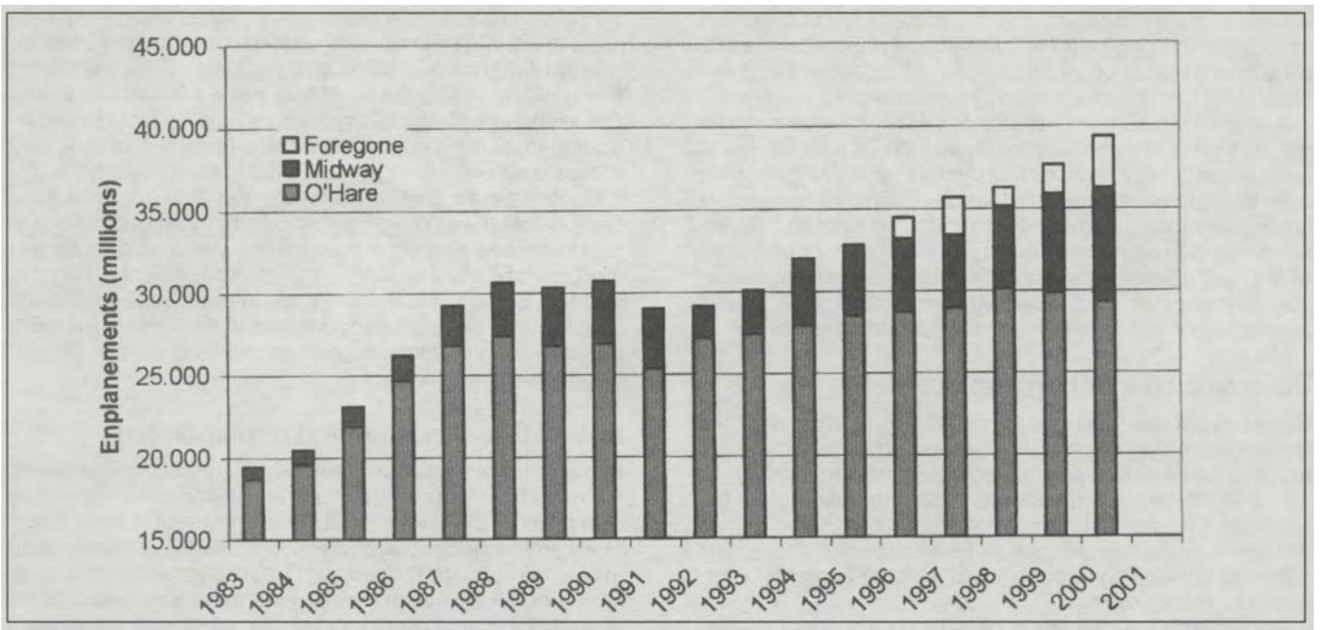

Fig. 7: Constrained domestic growth in Chicago, 1983-1999.

methodology should be economics-based and comprehensive. Forecasts should be prepared, not only for the region under study, but for all economic regions in the U.S. Such a comprehensive approach protects against unreasonable forecasts for a single region. The regional aviation demand consists of the following components:

- domestic origin/destination (O/D)
- domestic connecting enplanements
- international O/D enplanements
- international connecting enplanements
- freight operators

Domestic origin/destination enplanements

Studies by ACG: The al Chalabi Group, Ltd., during its fifteen-year work on the proposed Third Airport for Chicago, indicate that there is a very close correlation between economic activity and O/D enplanements. However, attempts to correlate changes in regional employment to changes in O/D enplanements have resulted in very low forecasts. This is because enplanements per job are increasing. This fact is recognized in the FAA's preparation of national aviation forecasts.

For this reason, the single-most important variable for predicting variations in a region's share of national domestic O/D enplanements is shifts in a region's share of national employment (fig. 8). Employment statistics are readily available at both the national and regional level by a number of national forecasting firms (WEFA, Woods & Poole, NPA). Furthermore, most regional planning agencies produce, debate and adopt employment forecasts as a primary guide for future development. ACG constructed and used an air-trip matrix of

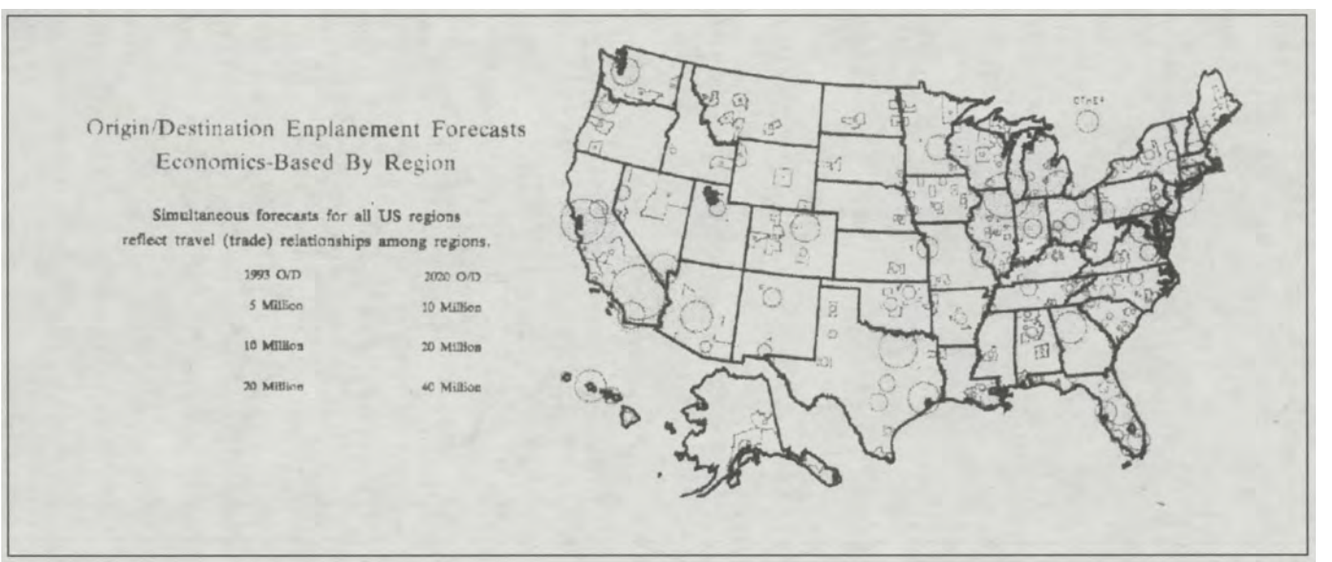

Fig. 8: Origin/Destination enplanement forecasts.

236 x 236 points of origins and destinations. This table was consolidated, to adjust for multiple airport regions, into a 202 by 202 unit matrix of urban regions. Employment and enplanement forecasts were made for each region.

A second variable that affects domestic enplanement demand is yield (a surrogate for fares). While past forecasts have assumed that regional fares would not vary significantly from the national average, differential (higher) fares are becoming significant at the most-constrained airports. Higher fares depress demand. This factor must be examined, as well, to adjust regional totals. Forecasts that do not consider current high fares, abandonment of markets and unreliable service would generate unreasonably low forecasts.

Domestic connecting enplanements

Connections are viewed as a collection-point stop on an Origin/Destination trip (fig. 9). Connecting hubs consolidate multiple small demands into several more-frequent flights. The methodology used examines the distribution of air trip origins and destinations throughout the United States. It then determines the most reasonable path to connect them. The potential for hubbing through any one major airport is determined by these paths.

Recognizing the difficulty in developing a national aviation network model to forecast connecting enplanements, many airports/regions try to develop regression models tying connections through their hubs to local conditions. The variables for such models vary from region to region and from time to time for the same region. The end results of such methods are usually connecting forecasts that simply fill the gap between the estimated O/D and the extrapolated total demand. The "flight path analysis", summed to the national forecast total, provides a consistent logic.

International origin/destination enplanements

Forecasts of international enplanements are both more complex (due to treaties and assignments) and simpler (due to the small number of entry points.). The methodology remains the same as for domestic O/D: identify the employment-generated growth in trips between points. In the ACG case, the points are 20 U.S. regions, served by 39 international airports and eight international destination regions (Canada; Central America and Mexico; Caribbean; South America; Europe and Middle-East; Africa; Far East and India; and Oceania). In addition to employment, international trade (including tourism) is used to determine the share of U.S. total international enplanements assigned to each airport.

Recent growth patterns indicate that the historic coastal entry points (New York, Boston, San Francisco) continue to lose shares as new entry points within the country open and more established ones grow (Chicago, Atlanta, Detroit, Dallas, Denver). Furthermore, as international operations (and visitors) bring greater revenues to the receiving airport, they are highly sought and given priority over smaller domestic operations.

International connecting enplanements

Because there are fewer international airports than domestic, the need to provide connections is considerable. The more connections, the more desirable the entry airport is. U.S./foreign carrier mix, cabotage regulations and the current urge to merge complicate forecasts of international connections. However, all airlines and airport planners acknowledge the desirability of and need for many and frequent connecting domestic legs for international flights.

Freight operations

Calculation of freight operations used to be fairly simple. With the exception of a few all-cargo carriers and primarily-cargo airports, freight was virtually subsumed by passenger traffic. Most freight was carried as belly-cargo; the few all-cargo flights occurred after hours. Those simple assessments are over as the growth of narrow body planes reduces the share of belly cargo; as the public's and business's need for express mail and just-in-time inventory escalates; and as capacity constraints push passenger operations into traditional cargo slots. With its growth higher than that of both domestic and international enplanement traffic, freight deserves greater attention. Data – both availability and consistency – remains a problem.

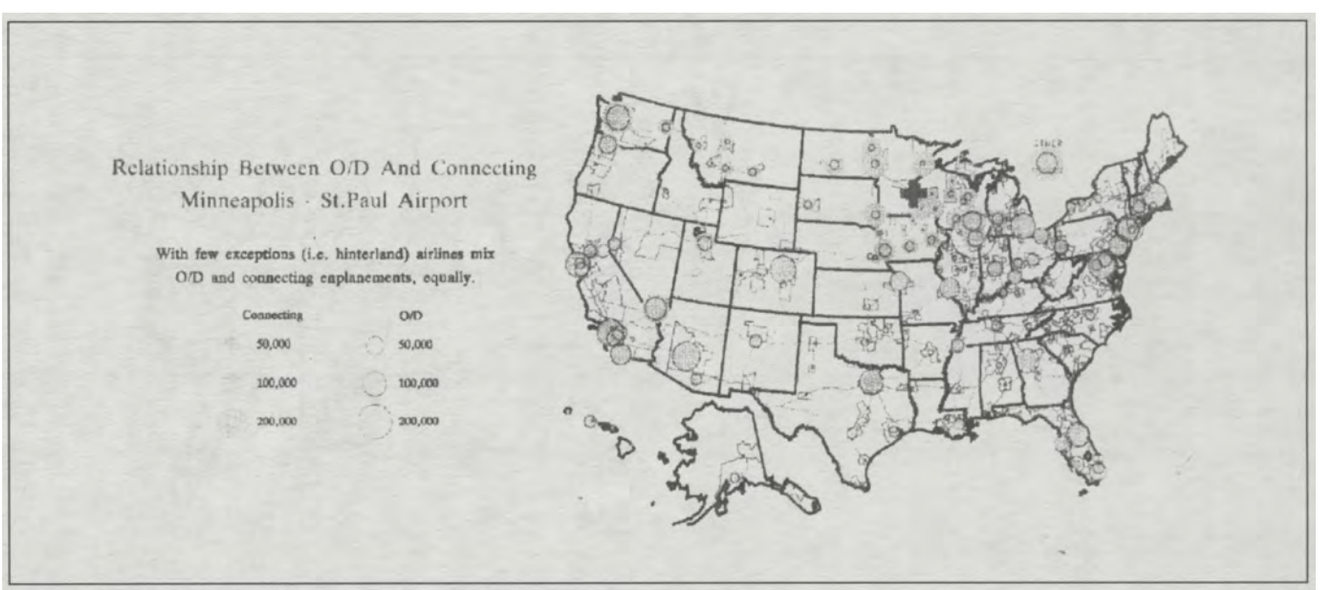

Fig. 9: Relationship between Origin/Destination and connecting.

Developing the models

Incorporating all of the above regional forecasts and using national aviation forecasts and national econometric forecasts as control totals, a national aviation network simulation (NANS) model can be developed. It would parallel ground transportation models (fig. 10). The NANS model would forecast regional air travel based on socio-economic factors; these forecasts would sum to the national. The model could provide aviation policy input similar to that provided by regional transportation plans. In multi-airport regions, or in regions considering supplemental airports, a second set of models would allocate enplanements to specific airports.

ports. In fact, because of their catalytic force, airports have drawn massive developments around themselves.

When plans are made for these airports, they are generally done under the constraints of a very-limited expansion potential. Consequently, the real and latent demands of their suburban regions are often underestimated. The long distances from suburban fringes to the old central airport also make these areas less attractive for commercial/industrial development. This reduces both job and travel options to the outlying resident. Yet, suburban fringes are the most desirable places to build new supplemental airports because available land is sufficient to buffer its adverse impacts and available to support the economic development that airports

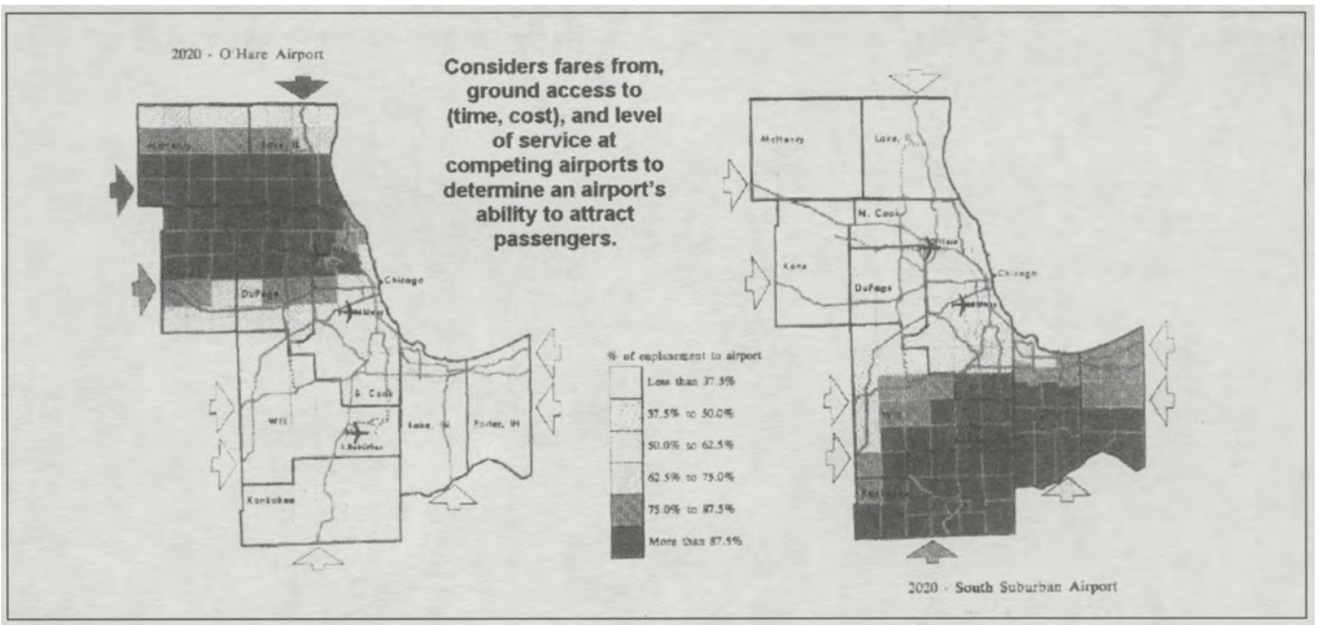

Fig. 10: Enplanement allocation model.

Policy implications of the model

Aviation is essential to the nation's participation in global trade and critical to each metropolitan area's ability to compete and grow with the U.S. economy. Air links are the highways of the 21st century. Just as highways were considered essential to national security in the 1950s, so should airports be today. Because many of the nation's oldest and largest airports serve older large cities, they have grown with those cities and now are landlocked. Expansion is costly; noise and traffic impacts are great; opposition is greater. This urban conglomeration is at the center of the aviation congestion triangle (New York-Washington-Chicago) that recently has caused cascading delays and traffic snarls.

This Northeastern/Great Lakes urban core houses 38 percent of the residents and 37 percent of the jobs in the United States. In spite of having a population increase of 8.4 million and a job increase of 19.7 million between 1970 and 2000, its number of airports has remained virtually the same. Since 1960, only two new airports, Chicago's O'Hare and Washington's Dulles have been added; and since 1970, none, although Pittsburgh, Detroit and Cincinnati were expanded. Massive growth and suburbanization throughout this segment of the country has landlocked most of its air-

attract. Many suburban residents, recognizing an airport's considerable economic benefits, want such development. One airline, Southwest, has made it a practice to locate in small, fringe airports; and small towns and airport operators flock to Southwest's door to bring them to town.

Because air service is so fundamental to economic development, no large group or urban segment should be denied it. Aviation planning and forecasts should ensure that all demands are recognized and accommodated. Because it is the user who funds the bulk of any airport development (PFCs, landing fees, parking), aviation is basically a pay-as-you-go (or grow) proposition. However, many who are paying are receiving little for their investment. A series of surveys, conducted in 1995, indicated that the residents of the South Suburban area of Chicago made up approximately 17 percent of the region's O/D travel and provided that share of the funding to the existing airports.

In spite of the fact that PFC legislation was enacted primarily to build a new airport for Chicago, those funds ($110 million collected annually) are being used to gild O'Hare without expanding its operational capacity. In fact, the City of Chicago continues to claim that O'Hare has adequate capacity through 2012, in spite of FAA conclusions that it is at capacity. PFCs should not be hoarded; and their primary use

should be to increase capacity. Current legislation on PFCs gives the airport sponsor and the incumbent airlines almost total control over these funds. New airport construction is entirely feasible with this funding. The proposed Third Airport for Chicago assumed PFCs that it can generate, as part of its financing plan; but it is being denied the PFCs that its market area currently is generating. Even though the South Suburbs of Chicago want a new airport, they cannot stockpile the PFCs that they generate for it.

Secretary Mineta has stated that he wants to see more runways and airports built, more concrete poured. Airline officials have begun to echo this call. Surprisingly, because of the considerable demand and the in-place funding mechanism, this could be accomplished if appropriate planning tools were used; obstructionist maneuvers were removed; and a more regional approach to PFC funding were implemented.

Also, a closer look at many regions would reveal that airports are recognized for their many economic benefits and that – contrary to conventional wisdom – desire for them has "bubbled up" in many places, such as Chicago. Chicago's South Suburban leaders have worked tirelessly to promote the South Suburban Airport; and Chicagoans have tolerated expansions at Midway, where homes are located within areas where noise levels reach 80 Dnl. Where the public has been extensively involved and informed of the planning process – such as in Minneapolis and Pittsburgh – airport expansions have been accepted. And, in cities such as Providence, airport development has meant both low-cost fares and economic growth.

The American public understands how important development and a thriving economy are. Furthermore, it knows the role that airports play in that development. But, the planning issues must be dealt with openly and honestly.

Inland freight transport scenarios for Europe in 2020

G.A. Giannopoulos

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The text that follows is based on the contribution by the author to the 15th International Symposium on Theory and Practice in Transport Economics of the European Conference of Ministers of Transport, Thessaloniki, June 2000, and is a slightly edited and revised version of a paper made available by the author to participants at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001, in which he was finally unable to participate.

Introduction

Forecasting trends and future developments in the transport field has never been an easy task. It is a sector that is sensitive to all those parameters affecting the trip-making "desires" such as economic development, social trends, habits, etc., and where major periodic "jumps" in technological or regulatory regimes may change the "scene" completely. In considering, therefore, the prospects and scenarios in the field of inland freight transport for the 21st century we clearly need to make some assumptions about the broad parameters that are likely to be present at the economic, policy, and technological levels.

Structural changes take place in "cycles," almost in an "epochal" fashion, that is characterized by a prevailing policy, trend, or technology and which influence directly the transport scene, or the political, cultural and economic environment in which transport operates.

There are first, long-term cycles which are due to major "jumps" in technology, or the political or social environment.

Examples of such cycles are the coming of the railways, the emergence of private motorized transport, the take-off in commercial aviation, and the recent dawn of the Information age. These were primarily "technical" revolutions but there are also examples of "revolutions" in the political or socio-economic fields, which started major long-term cycles of change. The creation of the European Economic Community (originally) and later the European Union is certainly one of them, as also is the abolition of Communism and the change of the Eastern European countries to market economies, or (perhaps of a smaller magnitude) the recent wars in South Eastern Europe.

On top of these long-term cycles, there are superimposed identifiable short-term ones. If we just take the past 20 years, for example, one can identify the 1970s as the age of energy and environmental consciousness, the 1980s as the age of "Regulatory Reform," and the 1990s as the "Decade of Infrastructure Issues." The information revolution cycle is only beginning and is likely to proceed with lightning speed all through the 2000s and 2010s. Already, technologies that now seem antiquated are less than 15 years old (e.g. the Fax) while others which have taken hold of the market and seem to be our daily way of handling things are less than 5 years old (e.g. EDI (Electronic Data Interchange), and the Internet).

From a forecasting perspective, the problem is therefore essentially one of predicting *turning points and then identifying the changes that a particular cycle will bring.*

It is not difficult to identify the cycle that we are currently entering. It is the cycle of information technology and telematics. Thus, the main attempt of this paper is to try and see what will be the likely impacts on freight transport in Europe in the face of these new technologies taking hold of the market. In doing so we also look into other elements of change that are not necessarily of a technology nature (e.g. changes in policy). Our "target" horizon of 2020 seems well justified since the "short-term" cycles of change (at all levels), that are now only beginning to show, will by 2020 have matured and taken full effect.

More specifically, within the framework of this paper which discusses the prospects of freight transport in Europe for the coming first two decades of the new century:

- The current situation is first analyzed and presented in the light of current trends and events that are likely to have an impact on the future, noting that
  - structural changes in the past are characterized by a prevailing policy, trend, or technology; and,
  - future changes are likely to be the result of such prevailing trends or technologies, proceeding to consistently see what these could be.

• The quantitative and qualitative outlook of future freight transport is then discussed in terms of expected developments and policy implications in: inter-urban, urban, and rural freight transport, identified as most likely "enabling factors":
- the new Telematics-based systems and applications, and the advances in Logistics and supply management techniques;
- more integration in the field of telecommunications usually referred to by the name of "Convergence," and of course the form and extent to which policy makers will resolve the still outstanding related institutional and legal issues.

• And finally, estimates of the likely timing for the (market) implementation of all these "factors" in the future are also made.

During the last decade the author has been involved in two major attempts at "forecasting" the future in the field of transport.

• The first was the work of the scientific network NECTAR (Network of European Co-ordinated Transport Research) of the European Science Foundation (ESF) under the name ***Europe 2020 group*** co-chaired by this author and published in Giannopoulos and Gillespie (1993). Part of that overall effort was also the work of another group of the ESF for ***Scenarios*** published in Masser et al. (1992).

• The second was the work that ended in December 1999, coordinated by the author, for the development of a 10-year Master Plan of research in the field of transport in Greece, and published in TRUTh et al. (1999).

The current context for transport

Our previous remarks about repeated failures in the past to predict coming cycles of change do not erase the fact that the future – especially the short to medium term future – is never independent of the present, or of the past, and ongoing changes, which are taking place, will inevitably have carry-through effects.

So, as we enter the 21st century, it is appropriate to start with the consideration of the trends and developments of the present and recent past, and use these in order to specify those aspects of the background within which to consider the future.

Major trends and events in terms of demand and policies

• We can start with the main "elements" that generally influence the **demand** for transport (not freight transport in particular). These are:

- The current socio-political environment;
- The prevailing value systems;
- New methods of production organization; and,
- New forms of spatial organization.

• **The current socio-political environment:** The last decade or so has seen an increasing reliance upon market forces as a means of regulating the supply and demand of transport services. In a period of rapid technological change, the market mechanism is clearly recognized to possess many advantages as a means of deciding between competing options. In the long term, the unfettered action of market forces may very well lead to the re-establishment of private monopolies in the transport field, requiring re-regulation. So, competition within markets as one of the principal forms of decision making within the transport field will necessitate a permanent mechanism for monitoring the proper functioning of the market, and corrective policy decisions if needed.

• **The prevailing value systems:** Shifts in societal value systems seem to be occurring which put greater emphasis on the satisfaction of individual rather than collective desires. Such a shift, if continued through, obviously has direct implications for all kinds of transport, in terms of the proliferation of "lifestyle choices" and the growth of new forms of consumption and leisure. At the same time, there is also evidence of growth in environmental or "green" value systems, the generalization of which will also have profound implications for future transport.

• **New methods of production organization:** New forms of flexible, lean, "just-in-time" production are being implemented, to meet changing customer requirements and expectations. These are taking place alongside a clear trend towards "globalization," which in the European context is expressed by the formation of a single European-wide production system. These new forms of production organization impose quantitatively and qualitatively different requirements upon the freight transport system, with general increases in the frequencies of movement, in the distance over which movement takes place, and in the required reliability of transport systems.

• **New forms of spatial organization:** Developments in transport and communications have facilitated the emergence of complex forms of spatial organization, in which much greater integration across space has taken place. Such integration can be seen at a variety of scales, including cities and rural areas, cores, and peripheries within national territories, and between countries at the European scale. More than 80 percent of the European population now live in medium-sized to large-sized urban areas.

• On the **supply** side, the efforts to satisfy demand are focused primarily on two areas:

• **Development of a coherent network of a European-wide Transport infrastructure:** The notion of the Trans European-Transport Networks (TEN-Ts) that incorporates European wide Road, Rail (both high-speed and conventional), maritime, inland water, and Intermodal networks, is the leading effort at the level of the European Union in developing such infrastructure. Other countries are following. The process of development is slow and requires funding far beyond what can be made available by governments alone. So, relatively "new" forms of financing through private, or public-private partnerships are being tested.

• **New technological possibilities:** These affect primarily the "supply" but may also affect the "demand" for transport. The use of **Telematics,** i.e the use of telecommunications and computing, is perhaps the major element of these possibilities. The "informatization" of transport (especially freight) as a result of the application of Telematics, is transforming the scene and has facilitated possibilities for greater integration as witnessed in the development of advanced logistics systems, and "network service" providers, etc. These, as already mentioned, are the focus of this paper.

• Coupled with the above "elements" at work today, and partly because of them, corrective changes are expected to the **Transport Policies** adopted by European governments. These are characterized by the on-going "full and unconditional" *liberalization process* in European transport markets.

• **At the EU level,** the move towards the EMU and an enlarged Single Europe has resulted in a number of concrete steps at liberalizing the transport market, which within the next 2 to 3 years will have eliminated practically all restrictions and transport-related barriers. As new countries become candidates for adhesion, and others are aspiring to do so in the first decade of 2000, the geographical limits of application of these policies will extend beyond the boundaries of the existing membership of the Union.

To mention the most important such liberalization measures that are going to take full effect, within EU countries, and produce wide-ranging impacts all over Europe by the turn of the century, we can list the following:

- Frontier checks for road freight crossing from one member state to another were abolished in 1993;
- All quota restrictions for road freight transport were removed with the exception of the eco-points system which is maintained for environmental reasons;
- Restrictions on cabotage on all modes of transport have gradually been removed from 1998 onwards and are expected to be completely abolished in all modes and countries by 2004;
- Entrance to the profession for road transport has been liberalized;
- Separation of rail infrastructure from railway services operation has been already introduced in the legislation of all EU countries;
- The concept of the Trans European Rail Freight Freeways (TERFFs) is being promoted;
- Price controls on airfares have been lifted;
- Revenue-sharing agreements have been removed in air transport;
- Common licensing and safety standards have been established in air transport;
- National quota restrictions have been removed in maritime transport; and,
- Controls at EU frontiers for inland waterways and cabotage have been removed.

• Together with these significant changes in international – primarily EU – transport policy, are on-going policy reforms **at the national level.** Practically every European government has a pronounced policy towards
– privatization of supply;
– liberalization of markets; and,
– decentralization of decision making.
A central point of concern is always the **environmental costs** of transport. This point has kept for a number of years (perhaps decades) the discussion going for a variety of measures such as **road pricing** and other policies. Some of these measures represent EU or OECD-wide initiatives while others are national or regional in their origin. In any case, the process remains very slow and cautious and it is still doubtful that the many regulations and policy decisions needed for road pricing implementation on a wide scale will be finally introduced.

• **At the organizational level,** significant changes are occurring in the way transport companies are organized and develop at corporate level. Various co-operations, mergers, and acquisitions are increasingly seen as important ways of minimizing the costs of transport supply, and increasing profit margins. As a result, the international transport supply industry is becoming "globalized" and the "mega-carriers," which are large multinationals operating in all modes of transport, in every country of Europe, are emerging in both freight and passenger transport.

Assumptions about the future context of Europe

If the above are some of the most notable current trends and "events," how could one predict the future? This can only be based on some assumptions about the overall context of Europe, i.e. the kind of Europe that is envisaged. This may look a bit farfetched question to ask, in the context of this paper, but after the rapid changes in Eastern Europe over the early 1990s, and the Balkan wars of the last 4 years, no question could be more appropriate but also more difficult to answer. Without being too specific, a few general assumptions are therefore necessary and these are presented here. Their presentation serves mainly as a reminder of the importance and relevance of the wider political and socio-economic context of change without which no discussion as to the shape of the future of transport can be meaningful.

• **Assumption 1**: *By 2020 the "European Union" will be larger than the current EU.* Very likely most or all of the eastern European countries and the countries now forming EFTA will have joined the EU, and the European Union will encompass between 400 and 500 million people – more than twice as many as the USA or the Asia/Pacific countries.

• **Assumption 2:** *By the same year (2020) there will be a stronger European Government with the means to impose and safeguard a European Transport policy.* This means that although each country will have its own legislation, jurisdiction and government, European Institutions will have decisive powers over certain sectors of the economy such as International Trade and Industry, Research and Technology, Environment, Transport, and Telecommunications.

• **Assumption 3:** *In the coming years until 2020 (and hopefully far beyond it) there will be peace in Europe.* The events of 1999 in South Eastern Europe have set some parts of this region back many decades in terms of transport (and other infrastructure) as well as on almost all issues of socio-economic development. So it may seem an obvious assumption to make, but it is very important to remember that all forecasts, by "default," are based on the assumption of peace and co-operation.

• **Assumption 4:** *European or national government policies will continue to be formed by a process of "balancing" the concerns for "growth," "equity," and the "environment."* "Growth" would call for a high-tech and market economy scenario with as little state intervention as possible. "Equity" would place emphasis on policies that primarily try to reduce inequalities in society both in social and spatial terms, while the "environment" would place the emphasis on the quality of life and environmental aspects.

The process of formulating policy is likely to continue in the future to be a stepwise one, that moves by successively focusing on one of these three basic concerns.

Changes to the quantity of freight transport

Overall transport volumes and modal shares

In terms of volumes of transport that are likely to materialize in the coming decades, all indications point to the fact that economic, social, organizational and spatial trends are bringing about a highly mobile society. In such a society, the movement of goods and people (as well as information) has increased in the past, and will continue to do so in the future.

By some EU estimates, characteristically used in support of the TEN-T policies (CEC, 1997), transport demand as a whole is expected to nearly double by 2010 as compared to 1995 (fig. 1). Cross-border traffic is expected to grow by 2-3 percent per year. By 2010 there will be approximately 30 percent more passenger cars and 20 percent more trucks in circulation.

The relative share of transport modes in the total inland transport work is a point of debate. Over the last 20 years or so, policies have failed to halt the "onslaught" of road transport in dominating both freight and passenger transport. Current trends show that in EU countries over the last 20 years road transport has increased its share (in total inland ton-km), from 50 percent to 70 percent in freight, and from 76 percent to 80 percent in passenger transport. These increases have been made to the detriment of rail and inland waterways, the first

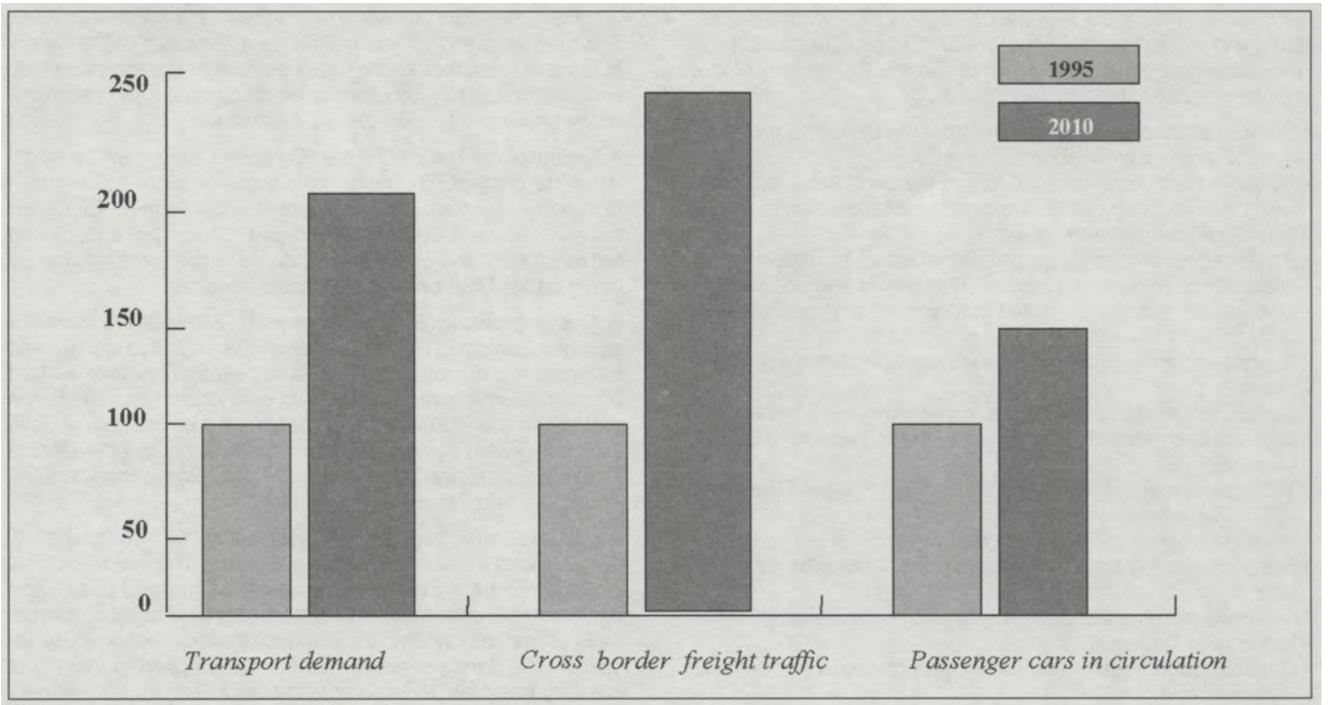

Fig. 1: Estimates of future transport in the 15 EU countries (base year = 1980).

reduced from 28 percent to 15 percent in freight and from 10 percent to 7 percent in passenger volumes, and the second accordingly (figs. 2 and 3). These figures do not include Short Sea Shipping (SSS), which if added will change these percentages somewhat, but not the overall picture.

There is very little indication of the magnitude of intermodal transport in the statistics, a fact that reflects their relative low magnitude in the overall inland transport work today. The actual figures are "impeded" in the above ones, but a safe estimate would be that intermodal (in the true sense of the word, i.e. as defined in the existing EU legislation) accounts for a mere 2-3 percent in freight transport, and even less for passenger.

As we are moving in the future in terms of the alternative policy focuses discussed above – i.e. from "growth," to "equity," and the "environment" – efforts to increase the share of intermodal transport, and at the same time increase the share of rail and inland waterways will be gradually intensified.

It would be reasonable to assume even a partial success of these efforts, which perhaps by 2010, but almost certainly by 2020, will bring a decline in the share of road transport in both passenger and freight to the benefit of intermodal transport. This will be more pronounced over certain major transport corridors that will be properly equipped to offer *a* convincing alternative to road transport.

A different view to the above was expressed in a recent book by Christian Gerondeau (1997). Using well-documented arguments, and adopting clearly a "road-oriented" perspective, Gerondeau challenges all "conventional" arguments against road and in favor of rail and other "green" modes. According to his view, the future is still "road-oriented" in both freight and passengers. The inefficiencies built into rail transport through decades of monopolistic inefficiency are hard to overcome, and produce a credible alternative to road transport. If this line of argument holds true, it may well be that the future modal shares will continue to look more or less as they are today and perhaps even more road-oriented.

Changes in the geographic distribution of (freight) flows

Besides the overall magnitude of (freight) transport flows, their geographic distribution is also subject to change. The main reason will be the different rates of GDP growth across the different regions of Europe. As was shown in Meersman and Van de Voorde (1997), an important factor in generating freight transport demand is GDP and the level of industrial production. These two factors do not always develop concurrently, because in a number of European countries economic growth is stimulated by the service sector and not by the industrial one.

Thus, as the prospects for industrial development of the less developed European regions of today are increasing, the relative growth rate in some Western European countries is likely to be lower than that of the others. As a result, the volume of (freight) transport will also develop at stronger rates along certain axes. The geographic location of these "new" axes of increased movement of freight can be forecasted by referring to the past and (expected in the) future indicators for GDP and Industrial Production across Europe. Towards 2010, and perhaps further beyond, higher growth rates of GDP and Industrial Production are expected in Southern and Eastern European countries as compared to the Western ones. Therefore, the rates of increase of freight transport flows are likely to be much higher in these areas of Europe than elsewhere, thus "moving" the bulk of inland freight, geographically, from western to a central, and south, southeasterly direction.

At the same time, a shift is likely to occur in the logistics chain that brings today most of the raw materials and containers, that support industrial production and consumption, through the large ports of Western Europe (Antwerp, Rotterdam, Hamburg, Havre). More and more of these materials in the future may well reach their final destinations via the Southern-South Eastern ports such as Gioia Tauro, Taranto, Piraeus, Thessaloniki, or the main ports of the Black Sea. This

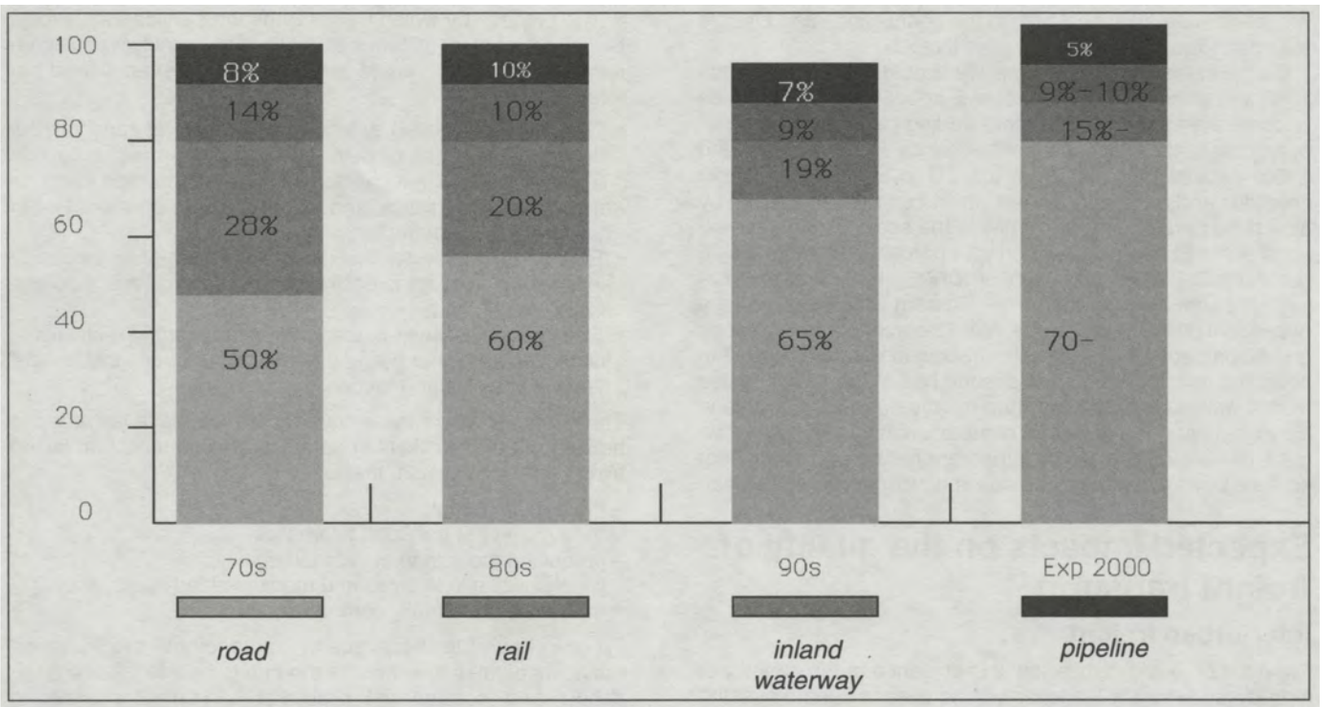

Fig. 2: Relative shares by mode of freight transport in the European Union.

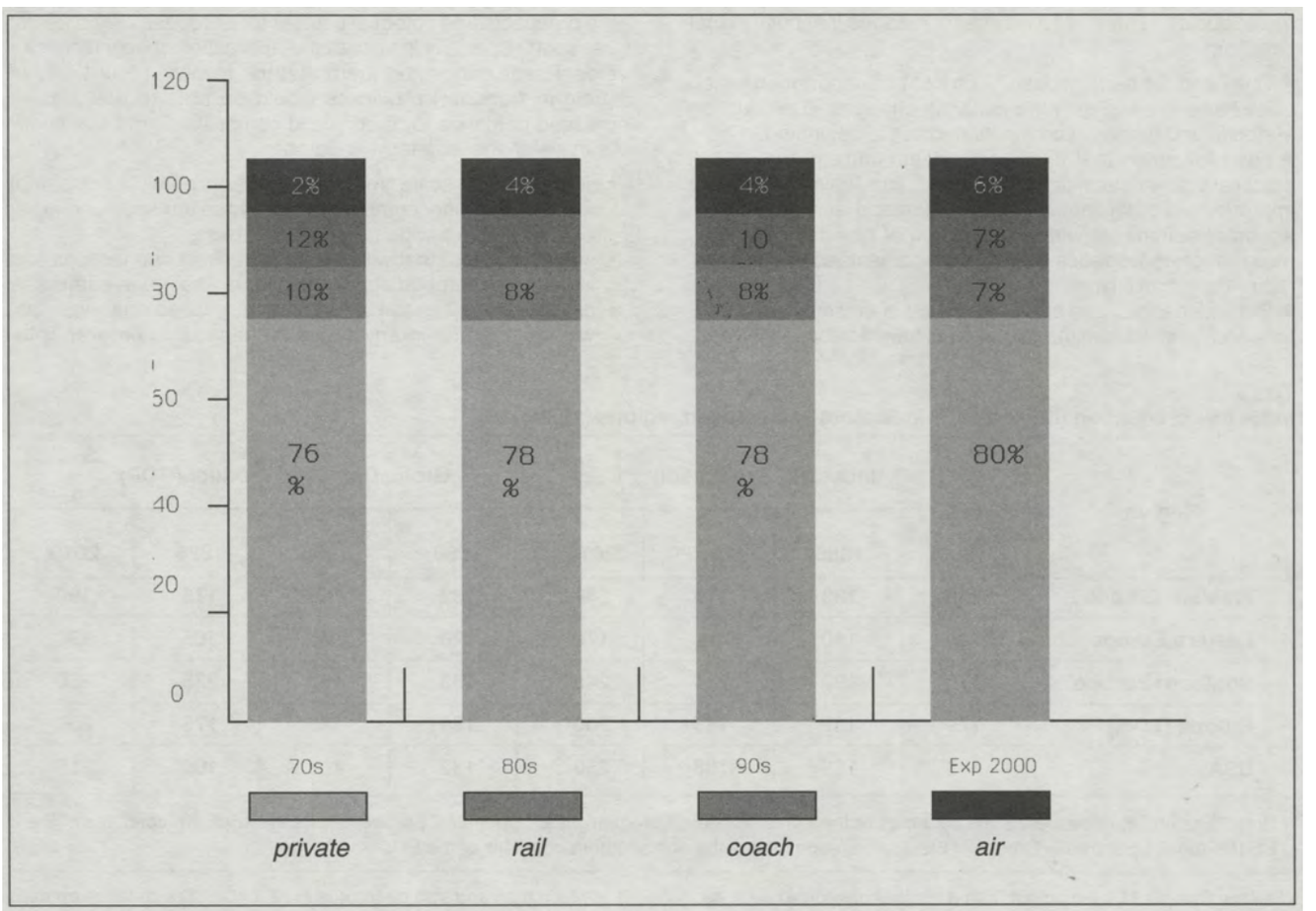

Fig. 3: Relative shares by mode of passenger transport in the European Union.

will result in an additional shift in the connecting inland freight transport towards these areas (see table 1).

On the same line of argument, we should note that between 1990 and 1996 the former Eastern European Bloc of countries became the third most important trading partner of the European Union, after Asia and North America. Between 1991 and 1995, exports of goods from the EU to Eastern European countries and the former Soviet Union countries increased by almost 50 percent in value, while in the same period total exports of the EU increased by only 11 percent and imports by 5 percent (MEERSMAN and VAN DE VOORDE, 1997). Similarly, during the same period, the former Eastern Bloc became very dependent on Western Europe, with 70 percent of all its imports and 60 percent of all its exports directed to Western European countries (WTO, 1995). In the second half of the 1990s, these trends were somewhat distorted mainly due to the events in Yugoslavia and the downturn of the economy in Russia. However, these events are of a temporary nature and should not confuse us as to the overall trends and prospects noted earlier.

Expected impacts on the quality of freight transport

Inter-urban freight

From the on-going discussion, it is evident that the quantity of long-distance freight Transport will increase in Europe over the next two decades, and the bulk of this increase will move geographically towards the developing Southern and Eastern regions of the continent.

As the level of traffic flows goes up, so will the demands for more "quality." There are a number of reasons that point in that direction:

- The need for more "quality" in freight transportation which goes hand-in-hand with the evolving changes in production methods and organization mentioned at the beginning.
- The realization that transport infrastructure provision will practically never catch up with demand, thus leaving a lot to be improved via other means, namely demand and traffic management actions, or wider application of new technologies, more integrated logistics chains management, and other "soft" rather than "hard" types of actions.
- The wider application and observance of environmental controls and restrictions in the operation of freight transport by land.

The process by which freight transport services will evolve to their future state (in terms of quality and quantity) will be characterized by the series of (short-term) cycles mentioned before, i.e.:

- "Growth," represented by increased volumes of transport, but also increased use of new technological infrastructure in Telematics and new technologies, new organization methods and advanced logistics, and to some extent development of new physical infrastructure;
- "Equity," i.e. wider availability and use of the higher quality services by an ever increasing number of small and medium-sized "users"; and,
- "Environmental" awareness, with environmental restrictions, incentives for higher use of intermodal transport, and "green" types of vehicles and modes.

The overall result of these "cycles," as we move towards the horizon of 2020, is likely to be a European inter-urban inland freight transport system that is:

– more multi-modal;
– "heavy" user of transport telematics;
– producing more market-induced quality;
– widely available to small and medium-sized users; and,
– more environmentally compatible.

To correspond to these quality "dimensions" the transport providers of the future will have to turn to new forms of organization and commercial practices. A rather pioneering European research project called EUROFRET (EUROFRET CONSORTIUM, 1993), assigned by the EU Commission's DGXIII (Directorate General for Research) in the framework of the 3rd R&D program at the beginning of the 1990s, examined the prospects and potential policies for European inland freight transport especially in view of the application of new technologies. It was suggested there that the following four types of (freight) transport providers would be able to fulfil the increased demands for quality and competition, and eventually "survive" in the long term in Europe:

- large size and scale "mega-carriers" or "network firms" that will be able to offer competitive integrated transport and logistics services to a wide range of end users;
- "subcontractors" that will survive with direct connections and "life support" through subcontracting by the mega-carriers;
- "co-operatives," i.e. small and medium-sized operators that will "co-operate" in any sense of the word in order to with-

Table 1
Industrial production (IP) and GDP indicators in European regions (1970=100)

Region	Industrial Production				Gross Domestic Product (GDP)			
	1980	1985	1995	2010	1980	1985	1995	2010
Western Europe	126	133	158	180	132	143	175	190
Eastern Europe	130	140	90	170	120	130	105	160
Southern Europe	173	192	215	245	153	167	225	260
Europe (W+S)	129	137	165	200	134	145	175	200
USA	139	159	198	250	132	151	190	215

Note: "Eastern" Europe means the countries of the former Eastern European Bloc. "Southern" Europe means the southern countries of the EU (Portugal, Spain, Italy, Greece), "Western" Europe means the non-southern countries of the EU.

(Source: Compiled by the author from a number of sources such as: Table 11 in Meersman and Van de Voorde (1997), OECD's statistics on main economic indicators (November 1998), and WTO statistics and projections).

stand the competition; and finally,
- "specialists," i.e. firms that specialize in certain types of services that cannot be "mass produced" by the mega-carriers.

Seven years later, the above views still stand valid, having been partially justified by the developments and trends of the past. It is expected that competition in the service provision will be the driving force behind the above developments in the organization of service provision. Since competition and other market factors are likely to press tariffs down, the main thrust for competitive advantage will be given by all four of the above types of operators in the domain of increasing the quality of service provision.

This is likely to happen via two major developments in the freight transport business environment of the coming decades:

- Higher integration of the transport provider into the whole supply Logistics chain. Supply chain management will be the higher order level of management into which Transport will be integrated as one of a series of other supply chain management functions such as order management, inventory control, warehouse control, etc.
- Closer co-operation and "integration" with the customer. This will necessitate more intensive use of information and telecommunications technologies in order to support the large amounts of information flows movement that will be needed between firms and spatially diffused customers. It is clear that with the relocation of service and manufacturing activities in space that is expected in the new and enlarged Europe of the future (as per our previous discussion and assumptions), freight transport firms will need a constant flow of information, both horizontally (i.e. between firms and customers) and vertically (i.e. within the company).

So, the most compelling forms of policy action that would follow from the above would be:

- Support on the development of advanced **international** transport infrastructure and data communications networks, to support the operation of the future freight (as well as other) transport system. The importance of national territorial transport infrastructure systems will gradually dissolve in the future.
- Adoption of competition rules and guidelines, both within one mode and between modes of transport, so as to avoid distortions to competition and monopolistic situations. The foreseen types of operator companies discussed above, that would in any case be compatible with market mechanisms, should be "protected" and "accepted" within the overall transport policy.
- Facilitation of the development of integrated Logistics services that take account of all modes of transport and thus give multimodal transport a fair chance of being selected.
- Greater concern and "promotion" of the interests of the final, end user in freight transport service provision.

Later in this paper we examine in more detail the new applications that are to be expected in the future in the fields of Telematics, and Logistics.

Urban freight transport and distribution

The increase of long distance, intercity, freight movement will be accompanied by an increase in short-distance final product movement, mainly in urban areas. As goods from production sites are moved more frequently and in greater quantities to storage centers, and from there to the final market, more need will arise for short-distance, more accurate and more "just in time" physical movement of freight vehicles. Globalization of markets will strengthen this phenomenon, augmenting the spatial distribution of final products and thus their physical movements in urban areas. As funds and space for more urban transport infrastructure become scarcer, urban freight transport in the Europe of the future will have to rely more and more on three areas of improvement:
- the development of electronic aids to help improve the operation and exploitation of the freight transport and distribution networks:
- urban traffic management systems to help optimize urban traffic flow: and,
- the development of new means and modes of urban freight transport (e.g. new electrical vehicles and pipelines).

- The first of the above areas of improvement corresponds to the **new Telematics and advanced logistics concepts** outlined above for inter-urban transport, since it will form the end parts of the integrated logistics chains mentioned there. As such, our discussion in the previous section, and the presentation of the expected advances in Logistics and Telematics fields that follows, covers also urban freight.

- Technologies for dynamic, on-line **Urban Traffic Management (UTM)** are likely to see widespread application in urban areas across Europe as early as the middle of the next decade. Urban freight transport will benefit from the creation of a whole new "environment" in which the urban traffic system is expected to operate in the future. It will aim to ensure the most efficient and productive use of the available space for the movement of people and goods. This new UTM system will be central to the concept of *Integrated Urban Road Transport Environment (IRTE),* i.e. a series of interlinked and co-operating Telematics systems and data bases that will allow on-line optimization of traffic flows, dynamic information to urban travellers, route choice and guidance options, and other functions.

Application of some sort of *demand management* actions, within UTM, to help reduce the load of private trip making in the congested urban space is also expected by the 2010 year horizon. *Interactive route guidance (IRG)* and *automatic debiting,* which have until now developed separately, will soon see unified application and this will open up new possibilities for efficient integrated demand management that will greatly shape the future of urban freight and distribution. The related issue of *road pricing,* i.e. paying for the use of road space in congested urban areas, is one that will also be of influence on the future shape of urban freight transport. Its principles have been discussed for several years now but agreement on a common attitude is far from being reached. In this author's view, some form of road pricing seems inevitable so that it will be at least partially in operation in Europe by the turn of the next decade (2010). This will be helped by the current development of integrated electronic toll payment systems that are now going through a period of intense technological and regulatory development.

Other aspects of urban freight management such as *Automatic Vehicle Location (AVL)* for Tracking and Tracing, as well as optimization of the distribution process, are examined under the section on Telematics.

- As regards the possibility of **new modes of urban freight transport** one can see two major developments:

- The first has really to do with alternative forms of vehicle propulsion and is not, strictly speaking, a new mode: for example new *electrically driven vehicles* with battery autonomy of more than 150 km. These new forms of propulsion are likely to be in considerable use in European urban areas by the next 8 to 10 years, but their full and widespread use is likely to take place in the second decade and towards 2020. The main incentive for this turn to new, cleaner types of fuels will be environmental concerns and the visible (by then) future depletion of fossil fuels. Current encouraging technological developments in the field of electrical storage (batteries) and alternative fuels are the basis for these assumptions.

• The second expected development is the increased use of *pipelines for* the movement of freight especially in urban areas. Plans already exist and in some cases projects are being implemented to develop underground channels for the movement of freight via pipelines. A well-known example, which is in an advanced stage of materialization, is the pipeline planned to be constructed for movement of freight to and from Schiphol airport in the Netherlands. Projects like this will be more and more politically and economically feasible as the urban areas become more and more congested. Our estimate is that pipelines will form a small but sizable part of the urban freight transport market by the year 2020 and beyond.

Freight "mobility" in rural areas

On the whole, the socio-economic and spatial development of rural regions in Western Europe will be to a diminishing extent based on the economic activities of these areas, and increasingly so on the role of the countryside as a "compensation" area for urbanized society. It will be the provider of "milieux" for housing, leisure and tourism and will be utilized as a reserve of both natural and cultural landscape. Consequently, rural areas will increasingly become destinations of more and more freight transport movements, and will increasingly acquire the needs of urbanized areas as far as the distribution of goods and freight transport services is concerned.

The potential for improving freight transport services to rural areas, in the future, will be posed much more strongly than today. Any improvements there will be materialized alongside with improvements to freight transport services for urban and inter-urban areas.

There are two distinctive differences between rural and other areas, as regards their potential for improving freight transport:

• The quality of rural telecommunications networks is generally far behind that of urban areas or of the networks that connect them (inter-urban). Improvement therefore of the rural telecommunication networks is a necessary precondition for the utilization of the rural areas' potential in development.

• In rural areas, "upgrading" demand is an essential element in the successful implementation of comprehensive freight transport services. In rural areas, the end users are even more "critical" of the operation of the whole system. Thus improving social infrastructure, especially in "education" to help individual end users become more and more acquainted with the modern technologies that are (to be) employed by freight transport, is an important factor.

Considering the wider socio-economic importance of keeping rural areas "alive" and "attractive" for people to live there, away from the big urban areas, the above points take on special importance. Thus, improving the service to these areas by high quality freight transport, alongside with the urban and inter-urban areas, should well be the primary goal of policies to be followed in the next two decades.

Enabling technologies and systems

The most critical "enabling" factors for the development of the freight transport services of the future are:

- first, the new computer and telecommunication technologies (Internet-based or other) and their related applications – referred to by the single name of *"Telematics";*
- second, the group of organizational and management applications that form the new field of *Logistics* and *supply chain or distribution management;* and,
- third, the *convergence* between the technologies and systems in telecommunications, information technology, the Internet and consumer electronics.

Freight Transport Telematics applications

Over the last 10 years we have witnessed a "revolution" that is still unfolding. It concerns the application, in the various forms of transport activity, of the new telecommunications technologies and computing known as Transport *Telematics.* Prominent among these technologies are the Internet, and the satellite or cellular telecommunications (GSM) based methods of transmitting data, as well as other technologies like smart cards, electronic payment systems, Tracking and Tracing, and so on. There is an on-going "revolution" at the moment as far as use of these technologies and systems is concerned that will change the form and content of freight transport within the coming two decades. In the following, we refer to these new systems in a structured way so that we obtain a common point of reference.

● **Systems and technologies:** The various Transport Telematics technologies and systems that affect freight transport operation can be presented in terms of the three main areas of their application, i.e. *systems for*
- *the vehicles* (on board the vehicle),
- *the network and infrastructure,* and
- *the office* (management of operations).

This distinction is primarily used for the purposes of presentation and discussion in this paper. Obviously all systems interact and co-operate to produce integrated applications. Also the distinction between applications for freight or for other types of transport is not always clear or meaningful and there are a lot of systems, especially the infrastructure used, that are in common.

❍ ***Systems for the vehicle:*** These are principally based on board the vehicle and monitor the condition of the driver (also assisting him in his driving), of the vehicle, and of the freight. There are numerous technologies and systems that support the availability and use of distributed intelligence on board the vehicle. They can be distinguished into systems for:

- monitoring the functioning of the vehicle itself or its equipment (i.e. monitoring of vital functions such as brakes, tyre pressure, steering, etc), as well as remote diagnostics and maintenance;
- the "intelligent" load (i.e. monitoring temperature, pressure, disturbances from bumpy road or driving, etc);
- aiding the driver in his(her) driving tasks; here are systems that range from relatively simple driver aids such as emergency warning, navigation and traffic information provision, and vision enhancement, to more comprehensive and far-reaching ones such as automated vehicle guidance, cruising, intersection negotiation, lane change, lane keeping, stop & go functions, etc.; finally,
- automatic electronic coupling of freight vehicles (especially for railways).

These will operate under the various high frequency communication high speed image processing technologies, and their interconnection with available open wide area networks of communication. These technologies connect the vehicle with a control center, at company headquarters.

❍ ***Systems for intelligent network infrastructure and management:*** In this area, there are various applications that deal with the provision and functioning of intelligent transport infrastructure and its management. They generally concern all types of traffic, but there are some exclusively for freight (e.g. weight in motion). Let us see in more detail the principal individual systems, most relevant to freight transport.

Intelligent, integrated urban (and inter-urban) traffic man-

agement systems have been mentioned before. Considerable work is still to be carried out to test in practice the new systems and for setting pan-European standards for integrated traffic management especially for inter-urban traffic. The possibility of using systems such as *Interactive Route Guidance (IRG), User Fee-Financed Infrastructure (UFFI),* as well as other services within an intelligent traffic management environment will open the door to a series of major applications. Agreement on standards for the USC (Unified short-range channel link) that will enable such advances has been in the past perhaps the most difficult task. As there are already systems available, a unification will come eventually, but it may be for the next generation of systems, i.e. in the 2010 horizon.

Of direct relation to the intelligent traffic management systems (or perhaps an eventual part of them) will be the potential application of ***systems to improve environmental performance*** at specific, sensitive, parts of the European road network. Such systems are of direct relevance to freight transport operation. In an *environmentally-led automated access control,* or "gating" system, specific actions and measures can be activated at pollution alert thresholds. In the ultimate stage of its development such an environmentally oriented system of traffic management and control will be precisely measuring the emissions and noise for all means of (road) transport and will provide reliable data for environmental condition monitoring and public air quality information. This will mean that weather conditions monitoring, coupled with a GIS-based forecasting of atmospheric pollution levels (perhaps linked with the monitoring of environmental vehicle parameters by on-board systems), will provide the basis of the fully *integrated environmental and traffic management* systems of the future. Such systems are likely to materialize beyond 2010 towards the 2020 horizon.

The establishment of a comprehensive and global ***system for positioning, communication, and guidance/navigation*** of vehicles will be another very important development that will influence a series of major advances in freight transport and distribution. These advances include universal and affordable systems of positioning and guidance that can be used by all types of transport vehicles and provide alternatives for a free and competitive market-oriented system operation. The ***Global Navigation Satellite System (GNSS 1 & 2)*** is one such example that is under development. The 2010 time horizon seems a reasonable time horizon for the full implementation of such systems.

On the contrary, ***Real time, interactive travel and traffic information*** **services,** to help drivers (and passengers) make the best choices concerning their travel, are expected to be in widespread use within the next five years. The communications networks, together with the equipment needed for user interaction, will develop in the near future along an independent path, derived from existing technologies such as ISDN, wireless GSM, and similar. End-user facilities for trip planning can be provided without difficulty by a series of different service providers. Widespread realization of such services is foreseen before 2010. What is needed is choice of a communication medium that is widely available, and standards as well as a reliable and well-established network of databases. As regards the communication medium and standards, the selection of the Groupe Spéciale Mobile *(GSM)* system for pan-European application has not so far acted as a catalyst, as originally expected. However, once the basic communication needs covered by GSM are fully met, improvements to the GSM technology and infrastructure are expected to open the way for comprehensive traveller information systems. Market forces are already strong enough to generate products with attractive cost/benefit characteristics in this domain. For freight transport, additional effort is needed to make the best use of the options available in the GSM specification for data transfer and manipulation.

For driver assistance and co-operative driving systems and their major functions of:

– *Intelligent Cruise Control (ICC),*
– *Co-operative Detection and Ranging (CODAR), and*
– *Interactive Route Guidance (IRG),*

the following can be observed:

• *Intelligent Cruise Control* offers such great improvements in safety, efficiency, environment and comfort in driving that already many of the automobile companies or their suppliers are engaged in developing it for commercial use. For Commercial Vehicle Operations, its major field of application will be on inter-urban travel. The early implementation of *ICC* will require choice of the method and technology for detection and range-finding. The "co-operative" nature of today's feasible solutions leads to the conclusion that an early agreement, on a European scale, between all the interested actors is less feasible in the near to medium-term future.

• On the other hand, *Interactive Route Guidance (IRG)* can be envisaged in the near future especially for dense and congested urban road networks.

• As regards *Co-operative Detection and Ranging (CODAR),* a common European approach to a suitable implementation path is still to be established. Arrangements at European level for a common frequency band (e.g. the 80 GHz) may take several years, making it likely to happen by the year 2010 horizon with wider commercial applications well after it.

Finally, integrated end-to-end applications of new technologies and systems such as the above are on the drawing board or in advanced stages of planning and pilot implementation in Europe or the USA. Examples of such applications are given in the section "European end-to-end applications."

❍ ***Systems for the Office:*** These systems include the so-called office "front-end" telematics applications. They are applications that deal with the "soft" side of the business. They aim at sorting out tasks such as freight handling and management, connection with the various telematics applications outside the office, connections to clients' systems and applications, integration with the so-called "back office" applications (internal organizational and managerial tasks), etc.

There is a variety of such systems currently in full development that are at present gaining acceptance and commercial success. The most important among them are the following:

• EDI applications to interconnect the office with the clients and end users (shippers) for freight order processing and monitoring as well as other tasks;
• Enterprise Resource Planning (ERP) software for financial-economic planning tasks;
• Internet applications for on-line load status information to the clients, and other customer interactive applications;
• Freight Resource Management applications, i.e. decision support systems that help intermodal transport operators to allocate freight to different transport modes under constraints of time, capacity, and cost;
• Systems that connect the central office with the monitoring of the position and status of vehicles and loads, and inform the clients (mobile EDI or Internet-based applications);
• Various applications for (pre)clearance with authorities at customs, border crossings, ports, and other similar points;
• Applications for finding and booking of freight capacity, such as (electronic) "Freight Stock Market," or communicating with other modes of transport for booking space (e.g. ferries); and,
• Special applications for hazardous goods management, e.g. handling, clearance with authorities, monitoring, etc.

Most of these systems are still in the development stage and are applied only in pilot applications. However, some applications, such as EDI for freight handling and interaction with clients, are now reaching their "critical mass" that will allow them to operate under full market conditions (stage 4 in the diagram of figure 4). Others, such as the various Freight Resource Management tools, are still in an experimental and pilot stage.

It is generally thought that the various "freight office" applications will develop fully within the first five years of the new decade maturing fully by 2010. The speed that characterizes the development and market acceptance of certain technologies such as the Internet (see next section) will also characterize the development and market acceptance of their related "soft" systems for the "front office."

● **European end-to-end applications:** By end-to-end applications are usually meant complete systems that incorporate a number of technologies, and offer end users, at both ends, a full and reliable service. Such applications are only now beginning to be discussed, planned, or under prototype or pilot implementation. It will take perhaps the best part of the first decade before we see any actual commercial implementations, but these applications are certainly along the lines of the integrated systems that we will see more and more in the future and that will characterize the 2020s.

Let us see in more detail two examples of European end-to-end applications.

● ***European International Commercial Vehicle Administration and Monitoring System*** (indicative name suggested by the author). This application envisions an integrated system that will achieve a seamless movement of freight vehicles in Europe through monitoring, management, controlling, and disseminating information about international road freight on the national and international road network. The functions impeded in such a system would comprise:

• *Public administration functions:*
- vehicle registration data
- driver registration data
- other vehicles and drivers information (e.g. driving penalties, point system, etc.)
- commercial vehicle safety data (for dangerous goods)
- fees and taxation data (e.g. in connection with transit fees where applicable, road pricing, etc.)
- border crossing information (where applicable).

• *Roadside function:*
- roadside weigh-in-motion
- citation and accident electronic recording
- roadside or border crossing electronic screening for vehicle and goods identification and other data exchange
- safety inspections as regards mechanical functions of vehicles.

• *In-Vehicle systems:*
- on-board cargo monitoring
- on-board vehicle mechanical functions monitoring
- cargo and vehicle identification data
- trip monitoring system (mobile EDI, Tracking and Tracing).

• *Company headquarters functions:*
- freight administration and management
- fleet management
- hazardous goods management
- vehicle maintenance management
- fleet taxation and credentials records.

Between the above four subsystems there will be telecommunication and data transfer links based on various appropriate technologies such as EDI and/or wireless or dedicated short range communications (DSRC). For example, between:

• Public Administration – Roadside systems: wireless or wire connection and EDI
• Roadside – In Vehicle: DSRC, or wireless
• Public Administration – Company: EDI
• Company- In Vehicle: Wireless (mobile EDI), DSRC.

Application of such a system on a European-wide scale is perfectly within the possibilities of current technology, and mainly needs political initiatives and acceptance. It would enable the seamless, non-stop movement of commercial vehicles on the European road network, with minimum (or zero) delays at border crossings or other control points. At the same time all data concerning the cargo, the vehicle, and the trip would be available to the administration, the company, and the end user. A system like this could be in application in the countries of the EU by 2005 at the earliest but given the fact that no initiative exists so far and the necessary political agreements between the member countries take time, a more likely date would be 2010. For the rest of the countries of Europe to join, it would take a few more years, probably by 2015.

On the contrary, in the USA a system that comprises almost all of the above elements is already being tested on a pilot basis. It is the Commercial Vehicle Information Systems and Networks (CVISN) program of the US DoT and the Federal Highway Administration. A number of research institutes and consulting companies provide the architectural and technical input to the program. More than 30 states are participating in the prototype and pilot application of CVISN, and many motor carrier companies. Full deployment is foreseen for 2005.

● ***Multimodal Mobility Centers.*** The idea here is to provide comprehensive information and services for multimodal transportation chains, i.e. the combined use of more than one mode for providing attractive and competitive end-to-end transport services to users.

The first stage of development would comprise the creation of telematics-based *"modal mobility centers,"* i.e. for each mode of transport. These would interconnect various sources of information concerning the particular mode, in order to provide "one stop" information to users. The types of information that would be available would include: schedule and tariff information, traffic management conditions and information, capacity availability, freight search functions (freight exchange), other travel information. These modal mobility centers would be based on ports, airports, highways, railway terminals, etc. and would be linked via the Internet to offices and information provision centers, or via mobile EDI to the vehicles themselves.

At a second stage, the modal mobility centers will be interlinked to support the interoperability of the various modes and to create the future *integrated multimodal mobility centers.* The promotion of intermodality and the Logistics applications mentioned in later sections will be greatly helped by these developments whose time scale, however, must be realistically put in the period 2005 to 2010.

● **The timing and process of innovation application:** The time scale for a wider, commercial application of these new technologies and systems will depend on a number of obstacles that have to be overcome. Already some estimates based on the author's experience and judgement have been given. The deciding factor for market acceptance will primarily be the user's perception of costs and benefits, or more precisely "value for money" for the particular technology or its various applications into systems.

For the past decade, the attitude of users was characterized by considerable distrust and hesitation towards investing in new technologies and systems. For the great majority of freight

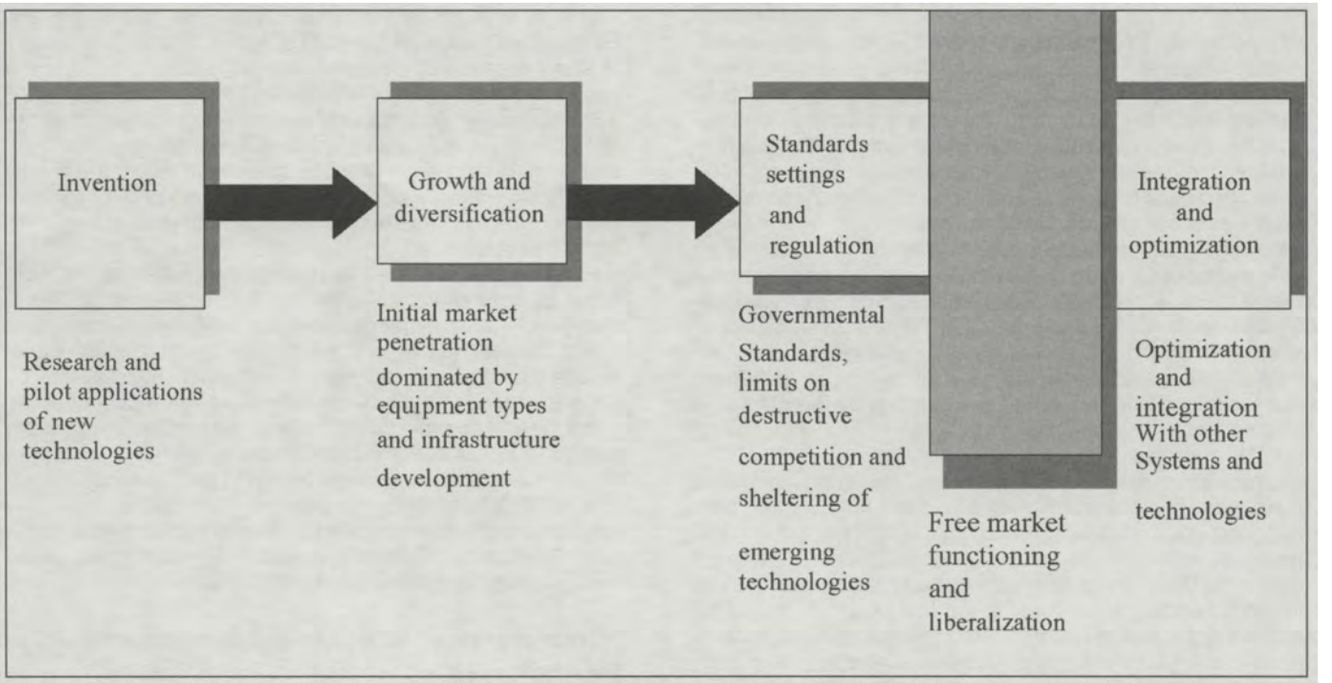

Fig. 4: The process for the development and market penetration of new technologies and systems (adapted from ENO, 1998).

transport operators, the attitude has so far been to look at these new systems as little more than fancy gadgets for scientists to play with, and not for the "real world." This attitude is rapidly changing, and it is certain that once a "critical mass" of users chooses to install and use one system then its wider application is substantially enhanced.

The process through which a novel system or technology catches on and becomes a marketable product is depicted in figure 4.

At the beginning there is (pre-competitive) research and development characteristically mentioned as "Invention" in figure 4. This is typically supported by government or private (industry) sponsored research. The EU's Advanced Transport Telematics (ATT) programme in the 4th and 5th FP is a typical example. This phase is followed by a stage of initial commercial growth and diversification in which market systems are developed and promoted in commercial applications. Concurrently with this phase but as a distinct process, and as a "critical mass" of users is achieved, the setting of rules and regulations for the orderly function of the market takes place. Then as the number of users increases, full market functioning and "liberalization" is achieved.

The final stage is the full optimization and integration of systems and services to achieve highest user satisfaction and acceptance. The whole cycle, from "invention" to full market integration and optimization, may take anything from 5 to 20 years or more, depending on the type of technology, its cost, market appeal, and other factors.

It is perhaps realistic to say that the coming two decades will be the time when most of the various Transport Telematics systems will mature and achieve wider market acceptance and integration till the right end of figure 4. As a general observation one can note that applications at the office, i.e. the ones that have to do with the management of the (freight transport) functions, will be the ones to proceed faster achieving integrated commercial applications within the first half of the decade.

The same can be said about the applications that are based primarily on Telecommunications and the Internet (e.g. Tracking and Tracing, booking, EDI – mobile or not, etc.). Others, that require more substantial (intelligent) infrastructure development, such as automatic vehicle guidance, cruising, intersection negotiation, etc., will take longer periods to mature, perhaps further than 2020.

One last observation regarding timing estimates. In the decade of the 1990s we have witnessed implementations and market penetrations of new technologies and systems at tremendous speeds. In a recent *Financial Times* survey *(Financial Times,* 1998), A. Waller of the Cranfield Centre for Logistics was quoted as saying that "Technology is driving change 20 times faster than 100 years ago." It took the telephone 35 years to reach 100 million subscribers but it took the Internet only 2 years to reach the same number. Similar speeds were experienced by the earlier technological novelties of the Fax (in the second half of the 1980s), or the e-mail of the early 1990s.

So if anything, the time scales mentioned in this and the previous section as possible implementation dates and horizons could materialize earlier if the reaction of the market to products based on the new technologies is similar to the one experienced so far.

The outlook in Logistics – Supply and distribution chain management

Of equal importance and significance as the new telematics applications for the future shape of freight transport in Europe will be the advance of Logistics as the ultimate "tool" for managing the whole supply or distribution chain. Freight transport will eventually be fully integrated into this "chain" management concept, and its control and management functions will be greatly influenced by the whole "science" of Logistics.

Supply chain management was defined in a recent overview by investment bankers Morgan Stanley Dean Witter

(Financial Times, 1998) as "the integration of the flow of materials, documents, information and finance, which optimises individual shipments." Correspondingly, delivery chain management is a similar procedure but for delivering final products to retailers and final customers. There are also the dynamic aspects of supply chain management which require information from the retailer on daily sales of particular products to be transmitted back to the manufacturer to influence decisions on design, sourcing and production volumes.

Managing supply or distribution chain brings together all parts of the supply or distribution process, transportation being one of them, which were previously regarded as separate. **Enterprise Resource Planning** (ERP) is a relatively new concept that was defined in order to help do exactly that. ERP software is already available to pull such information, and the various tasks, together but its full acceptance by the market is expected to take its time until maturity, some time into the first half of the coming decade.

Application of advanced Logistics and supply or distribution chain management techniques are revolutionizing the way freight transport is conceived and organized. They are likely to form the primary basis for the way that goods are moved around in the coming century. Already the application of advanced Logistics concepts in the last 10 to 15 years has reduced costs, such as administration, inventory, warehousing and transport for the large companies who apply such systems, to 7.5 percent of revenues in 1998, from 14.3 percent in 1987. Something of the order of 6 percent would be the absolute minimum to be expected by 2005. Also cycle time reductions were down from 27 days in 1987 to 12 days in 1998, and these are also levelling out with only three more days expected to be taken out of delivery lead times by 2003 *(Financial Times,* 1998).

New concepts are being developed which are expected to be the new "catchwords" of Logistics in the coming decade and consequently have an important impact on freight transport and the way it is executed and organized. For example:

- "Agility" and "leanness" are the concepts that will characterize the next stage in supply chain logistics;
- Customized packaging, labelling and pricing, and increasing exchanges of personnel with customers is also a novel idea expected to catch on in the first decade of the new century;
- On the technology front, increased use of barcodes or electronic tags (if they become, as expected, cheap enough) to track products through the system and increased sales through the Internet are to be expected;
- "Postponement" is a key concept with products customized at the end of the delivery chain for particular markets and individual customers to minimize the need for stock-holding. The boundaries of manufacturing and distribution are becoming blurred. Delaying the finishing process reduces inventory.
- The need to tailor products for the individual customer is spreading from high value fields, such as cars, to more mundane, lower value articles. This process, known as *"mass customization,"* puts further pressure on the supply chain. Mass customization attempts to deliver a tailored product for the same price as a mass produced one.
- Home shopping, primarily via the Internet, is being introduced gradually and is expected to become a major form of shopping by the year 2010 and beyond.

The implications of these developments that will penetrate the market gradually over the greater part of the 2010s, maturing towards 2015, are far-reaching not only for the way we view today's freight transport, but also for the manufacturers and retailers as well as for the third party logistics suppliers themselves.

The global market for Logistics and related services is expected to increase tremendously over the coming years. Estimates of its size for 1996 are shown in table 2. The change of approximately 20 percent between 1992 and 1996 is expected to more than double between 2000 and 2005.

What exactly the effect will be on freight transport of the widespread application in practice of the above new concepts and ideas is hard to predict. The quantity of freight travel may be affected upwards or downwards by some of the new concepts but certainly the quality of freight transport services will have to increase.

For example the need to provide cost-effective, reliable home delivery and/or collection facilities as part of the "home shopping" (teleshopping) trend via the Internet, can have mixed impacts on freight transport. It may, on the one hand, reduce the number of journeys as individual shopping trips by car are replaced by a smaller number of van trips, but at the same time, if centralized distribution centers are utilized, the number of lorries delivering to local stores will fall. The study of the potential impacts on freight transport (and transport in general) of the full introduction in practice of advanced Logistics is a fascinating subject for study, like the investigation of the potential impacts of teleworking, and in this respect the coming decades may bring revolutionary changes.

"Convergence" in the telecommunication technologies

Perhaps the most powerful enabling technology, for freight transport, is becoming the Internet and its related telecommunications technologies. In just over two years Internet-based applications for freight transport have moved from 1st generation applications of simple presentations of the transport providing companies and their services to the 2nd and 3rd generation of dynamic, interactive applications in which the end user can plan, book, and follow the progress of his (her) transport. These applications are penetrating a surprisingly large number of users very fast (in fact as fast as the Internet penetrates the market). They can be seen to become widespread within the next three years or so.

Here too, the trend is towards the integration and interoperability of the various telecommunications technologies that are promoted now all over Europe. The term that has come to encompass this trend in the telecommunication technologies is **Convergence.** This is defined as the union of telecommunications, information technology, the Internet and consumer electronics. Its influence will be manifested by an entirely new generation of products and services generated from the cross-pollination of these disparate industries. If the speed by which the Internet sized up the business world is an indication, *Convergence* is expected to take root and generate a whole number of new applications no later than the middle of the new decade. This development will facilitate the materialization of the freight transport systems and services that were anticipated earlier and which are in close relation to users' needs.

When we think of *Convergence,* we should think of the convergence of today's personal computer and the Internet to the point that the Internet will be "the computer." In the not-too-distant future, the information stored on each of the individual computers will instead reside on the Internet. Thus, the Internet becomes a storage medium for both data and applications as well as a communications medium, distributing virtually unlimited computing power to anyone, with low-cost, high-performance Internet access devices. Two or three years from now, the new technological breakthroughs of *Convergence* will be possible because the pipes used to transmit digital information are already evolving into "broadband."

The impacts of these developments on the way that freight transport will operate in the coming decade will be very sub-

Table 2
The global market for Logistics

Geographic Area	GDP ($m)	Logistics ($m)	Logistics GDP%
North America			
Canada	585,105	70,191	12.00
Mexico	334,726	49,753	14.86
US	7,576,100	795,265	10.50
Sub-total	8,495,931	915,209	10.77
Europe			
Belgium/Luxembourg	286,383	32,573	11.37
Denmark	174,237	22,440	12.86
France	1,537,582	171,230	11.14
Germany	2,352,472	306,264	13.02
Greece	122,870	15,269	12.43
Ireland	67,392	9,611	14.26
Netherlands	392,550	44,495	11.33
Portugal	101,182	12,871	12.72
Spain.	581,565	67,022	11.52
UK	1,151,348	122,344	10.63
Sub-total	7,961,853	941,141	11.79
Asia/Pacific			
Hong Kong	153,068	20,332	13.71
Japan	4,599,706	522,982	11.37
Korea	484,777	59,764	12.33
Singapore	94,063	13,074	13.90
Taiwan	273,440	35,686	13.05
Sub-total	5,605,054	652,498	11.64
Remaining other countries	7,080,122	916,168	12.94
1996 global size	29,162,960	3,425,021	11.74
Estimated 1992 global size	23,743,432	2,894,092	12.19
% change 1992-1996 ($m)	23	18	3.6

(*Source: Financial Times* survey on supply chain Logistics, 1998).

stantial. Applications such as full electronic transfer of documents, on-line connection to the various government agencies for customs and border crossing clearance and other services, on-line tracing of the goods by the customer, booking services, electronic "freight exchange," intelligent freight planners, etc., will become possible at a mass scale reaching inexpensively even the small and medium-sized users.

Key horizontal and policy issues

Policies to facilitate innovation and to resolve some of the contradictions and sustainability questions that arise in the evolution from the "Invention" to the "Integration-Optimization" phase of figure 4 will always be necessary. In this technology-led (r)evolution of a market-driven freight transport operation in Europe, national and international governmental policies should focus primarily on a number of horizontal issues that will form the necessary guiding paths of development, and will make sure that the interests of the final users are secured. These are presented in the following.

The continuous push for integration

As we have already indicated, technology trends are such that within the first decade of the new century, advanced information systems will expand from networks within individual companies to open networks, and the quality of the information processed in such a network will improve tremendously. It is also expected that such systems will expand from within a particular industry to large community systems and to international information systems. Many companies have already created worldwide information networks that facilitate the flow of information necessary to control the new logistics applications. There is an obvious need, therefore, to push for truly integrated freight transport services that will take advantage of the tremendous possibilities offered by *Convergence* and the new information transfer networks.

Integration has to take place at the geographical, the technological, and the modal level.

- At a geographical level, we refer primarily to services that are truly international.
- Technological integration calls for all standard problems to be overcome, both in the telecommunications and transport arenas, in order for genuinely border-less infrastructures to be developed.
- At the modal level, integration of modes means truly multimodal systems, i.e. offering the user the optimal combination of modes according to commonly accepted socio-economic criteria.

The continuous push for more integrated systems and services that will benefit the end user (shipper) should therefore continue to be a very important policy objective to pursue in the short to medium term future until the market itself makes the provision of such systems self-supporting and evident. It can even be said that the strength and success of the development of transport and related telecommunications infrastructure in Europe in the future will be related to the degree of implementation of the above three levels of integration *in both* the transportation and telecommunication systems.

The continuous push for pan-European and world standards

Many of the developments in telecommunications and information technology and their applications in freight transport and logistics will emerge in different ways, at different times and at different speeds. Trying to control these developments in a top-down approach will cause inflexibility and inefficiency and it is not advisable. However, the proliferation of all kinds of systems may also be harmful, and some kind of assistance in the required standardization, or help in achieving horizontal and vertical co-operation among the various systems and technologies, is valuable. This is an important policy task for governmental organizations.

The need for continuous monitoring and some control

All over the world, deregulation and privatization are emerging as the current basis for policy formulation in almost all aspects of economic activity including of course freight transport. It is assumed that these basic economic policies will create possibilities for increased efficiency through competition amongst companies and countries. There is no doubt of the necessity for continuation of these policies and trends. Indeed, it is only within a competitive and carefully deregulated environment that all the changes anticipated in this paper can take place. There is an important need however for policy makers and governments to organize basic monitoring mechanisms to ensure that safety and environmental protection rules are followed and that monopolistic tendencies will not occur, while the true interests of the end users are met. Thus governments should organize permanent market observation mechanisms in order to systematically gather statistics and monitor what is happening in order to take appropriate action if necessary.

Solving the institutional and legal issues

From the preceding analysis it becomes clear that the new technology-driven systems and infrastructure cannot simply develop from the modernization of existing physical infrastructure through repair, replacement and optimization of existing systems. They will also require the technological modernization of entire systems, including their institutional and social components. Even if we therefore assume that the technical and infrastructure aspects will primarily be materialized as a result of market forces initiatives, or their co-operation with public bodies, governments should primarily address the institutional and legal aspects.

Examples of such institutional and legal aspects are questions of liability and authentication in EDI, questions of securing privacy and accuracy in electronic booking and payment systems, protecting the commercial interests of companies dealing through the Internet as regards access to confidential information, various fair competition issues, the issues related to the internalization of the external costs, etc. These issues are not of course static and therefore governments should establish permanent procedures to address them and take appropriate action.

Considering the social and behavioral issues

Freight transport is part of society's overall "mobility package." As such, there are serious questions about the future operation of the freight system that relate to social justice, equity, and public acceptance. These questions, or rather their disregard, are usually part and parcel of processes that result in uneven development and consolidation of asymmetrical power relationships between the various regions or geographical areas.

Raising questions of social justice and exclusion may perhaps, at this current phase of policy framework in Europe, be considered to belong to an outmoded frame of mind. However, absence of these considerations cannot remove the problems of those who are caught in the doldrums of persistent deprivation and perpetual restructuring, and will not prevent these questions from being restated more strongly in the future. As we therefore look forward to technological breakthroughs that will radically change the way freight transport is performed in the coming 21st century, we should not stop including the social aspects and impacts in our debate and praxis of future mobility systems (freight or other).

Consideration of the externalities

This item is well known and follows most transport policy considerations. In order to achieve optimal usage of scarce resources, all of the costs that society has to pay for (e.g. for the adverse environmental effects), in order to facilitate transport activities, have to be taken into account, and ideally be paid for by the users of these facilities. Freight transport is no exception. On the contrary, it has been in the past at the center of debates concerning compensation for external costs, primarily those caused to the environment.

In the coming decade, or just beyond, the same technological breakthroughs that will make the foretold "revolution" in freight transport operation possible will also make it possible to measure and account for these external effects. The issue will then be primarily a political one. Of course, the internalization of external costs – also relevant in areas other than transportation and communications – could lead to significant changes in decision making, and therefore will continue to be of the utmost importance in the future.

Conclusions

As we enter the first decade of the 21st century, and look towards 2020, freight transport in Europe stands at a crossroads of technological development opportunities that will radically change its face, but also of yet unresolved institutional and other policy issues that will determine the range and extent of these changes. As the remaining few restrictions are removed and the liberalization of freight transport in the European Union countries becomes complete (soon after 2000), freight transport operation at European level will seem to be proceeding at two speeds:

- one, characterized by high organizational efficiency and free from administrative and other restrictions, led by technological solutions that are now already at various stages of development; and,
- one in the remaining countries of Europe, mainly in the East, continuing to enforce restrictions, and lagging behind in technological efficiency.

As the EU is enlarged, these disparities will tend to disappear.

The first realization, concerning future European freight

transport, is that its volume is likely to further increase, both overall and within certain modes. By some forecasts cross-border traffic is expected to grow by 2-3 percent per year while by 2010 some 20 percent more trucks are expected on the EU roads. It is an open issue whether the current predominance of road transport will continue to exist in the coming decades. This issue is likely to remain open until credible alternatives are presented to the users either in the form of rail or multi-modal transport. At the same time, a shift of the freight transport volumes can be foreseen from Western European corridors to Eastern and South-Eastern ones as development moves at higher rates in these parts of Europe.

As regards the quality of freight transport services, the overall result of a series of expected "cycles" in the focus and priorities of future developments will be a European inter-urban inland freight transport system with more market-induced quality, and which is:

- more multi-modal;
- a "heavy" user of transport telematics;
- widely available to small and medium-sized users; and,
- more environmentally compatible.

Consequently the structure of the freight transport market as regards the types of companies offering services is expected to be defined by:

- large size and scale "mega-carriers" or "network firms" that will be able to offer competitive integrated transport and logistics services to a wide range of end users;
- "subcontractors" that will survive with direct connections and "life support" through subcontracting by the mega-carriers;
- "co-operatives," i.e. small and medium-sized operators that will "co-operate" in any sense of the word in order to withstand the competition; and finally,
- "specialists," i.e. firms that specialize in certain types of services that cannot be "mass produced" by the mega-carriers.

The **inter-urban freight** transport business environment of the coming decades will be characterized by:

- Higher integration of the transport provider into the whole supply Logistics chain. Supply chain management will be the higher order level of management into which Transport will be integrated as one of a series of other supply chain management functions.
- Closer co-operation and "integration" with the customer. This will be achieved through more intensive use of information and telecommunications technologies in order to support the large amounts of information flows and data that will be needed between firms and spatially diffused customers.

Urban freight transport will be dominated by developments in

- Urban Traffic Management systems, and
- New fuels or modes of urban freight transport.

The first will be the result of the combined implementation and operation of a whole new series of technologies and systems of urban telematics that will form the Integrated Urban Telematics Environment of the future. The second will result from the advent and wide use of new fuels and electrical vehicles, as well as of underground pipelines for the transport of urban freight.

At the same time, **rural areas** will increasingly become destinations of more and more freight transport movements, and will acquire more and more the needs of urbanized areas as far as the distribution of goods and freight transport services is concerned. The need for improving freight transport services in rural areas in the future will be posed much more strongly than today. Any improvements there will be materialized alongside with improvements to freight transport services for urban and inter-urban areas.

The "enabling" factors for the expected changes in the future freight transport services will be three main developments:

- the full application of the new *Transport Telematics* technologies and systems;
- advances in *Logistics and supply chain management* techniques; and,
- possibilities that will emerge from *Convergence,* i.e. the union of telecommunications, information technology, the Internet and consumer electronics that will give limitless new telecommunications and computing capabilities.

The presentation and discussion of all three of these factors in the previous sections of this paper, and of the most prominent of the new systems and applications, revealed a number of possible implications for European freight transport for the coming two decades. It also indicated a possible timing for their full market implementation

According to this analysis, the period between 2005 and 2010 is likely to be the period that will mark the changeover from the current period of prototyping and pilot application for most of the various new systems to their full market operation and wide user acceptance. Then the years beyond 2010, towards 2020, will see the further optimization and integration of systems and services and the full implementation of complete end-to-end systems covering geographically the whole of Europe.

The time scales indicated above are not so much the result of the anticipated speed of implementation of the new technologies and systems (which are likely to mature at very high speeds anyway) but also of the time needed for administrative and legal issues that will have to be resolved. In this respect and even with the assumptions that were made at the beginning of this paper (about the enlargement of the EU, the strengthening of the European Institutions, the establishment of peace, etc.), Europe has an added difficulty as compared to the USA. It is the diversity of national interests and policies that are followed by the various countries, as opposed to the independence but much more uniform approach and policies followed by the states of the USA. Therefore it is perhaps of equal importance, with the advent of the new technological possibilities, to take into account the crucial horizontal and other policy issues that will go hand in hand with any new developments.

A number of these issues were addressed:

- Horizontal and vertical integration of systems and applications. Two characteristic examples were given of such integration in the previous sections. One was the establishment of a *European International Commercial Vehicle Administration and Monitoring System* that would enable seamless movement of freight vehicles in Europe while all monitoring, management, controlling, and information dissemination functions would be made electronically. The other was the establishment of *Intermodal Mobility Centers* that would provide users and operators alike with on-line information and data about freight (or passenger) travel by all modes.
- Establishment of new European and international standards to cover the functioning of the new systems.
- Establishment of mechanisms for continuous monitoring of the function of the market and if necessary controlling it, in order to safeguard the interests of the end user.
- Solving some outstanding institutional and legal issues that stand in the way of a wider market implementation of new technological systems. Examples of such issues are questions of liability and authentication in EDI, questions of securing privacy and accuracy in electronic booking and payment systems, protecting the commercial interests of companies dealing through the Internet as regards access to confidential information, various fair competition issues, the issues related to

the intemalization of the external costs, etc.
• Making sure that the implications to society and social justice are addressed and dealt with. And finally,
• Finding ways to bring into the picture the much discussed, in the past, external costs such as the environmental costs associated with freight transport operation of all modes.

The importance of these policy issues cannot be underestimated. Past experience teaches us that achieving consensus and political agreement is perhaps the most difficult and time-consuming part of implementing technological innovation. Basic economic and social history also teaches us that all human behavior, preferences, and trends are periodical in nature and, as was stated in the Introduction, real life progresses in cycles. So the current period of intense deregulation and privatization is likely to be followed by some kind of return to regulation and more government involvement. The overriding issues could be the need to preserve the environment or secure some minimum level of safety and social equity and public service. It is difficult to predict when this turn in current policies will occur. But it is quite likely to be within the period up to 2020 that we examine in this paper.

As we therefore look forward into the opening 21st century, we can see the market application of a number of technological breakthroughs that will radically change the way freight transport is performed today. At the same time we hope that the delicate social and political issues associated with these new applications will also be solved soon, and that European policy makers will be able to proceed at the same speed and efficiency as new technology.

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A Pan-European, competitive public transport system

Kjell Dahlström

The author is Director-General of the Swedish National Public Transport Agency which coordinates and procures interregional public transport throughout the country. He is a member of the World Society for Ekistics (WSE). His professional and political career is described in the following article which is a slightly edited and revised version of a paper presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

History

Appearing at the World Society for Ekistics Symposion in Berlin, October 2001, precisely 30 years after having entered the postgraduate class at the Athens Center of Ekistics, meant so much more than nostalgia. It meant the possibility to close a wide circle, coming back to those ekistic principles which more or less have guided me through my career.

In Athens I studied Ekistics, of course, and especially the Scandinavian branch of the Ecumenopolis concept. This produced as a result a paper on The Scandinavian Capital Triangle where I argued for a somewhat revised setting of Ecumenopolis in Scandinavia.

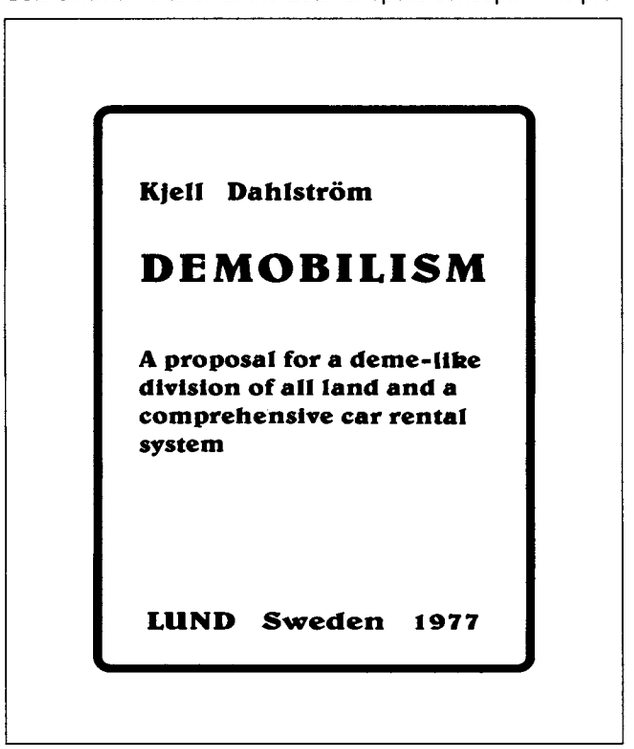


Fig. 1: A Pan-European, competitive public transport system.

Fig. 2: The Caryatids, who had supported the Erechtheion on the Acropolis in Athens for 2,500 years, had deteriorated so rapidly in the last 25 years, due to fossile-powered automobilism, that they had to be replaced in the 1970s by plastic models. Which should have been moved – Cars or Caryatids?

After my year in Athens 1971-1972, I wrote my thesis at the Department of Architecture, Lund, Institute of Technology. The title of the English summary of the thesis – *Demobilism* – was a play on words (fig. 1).

The first part played on the Greek word Demos (municipality or people) as the thesis analysed and argued for neighborhood planning ideas. The last part played on the word "mobile" because a proposal for a car-pooling system was launched in the thesis and supported by an actual car-pooling experiment. There was of course a criticism involved around the automobile society which was depicted by the wounded Caryatid at the Erechtheion in the 1970s – Cars or Caryatids? (fig. 2).

I continued by carrying out research projects on car rental

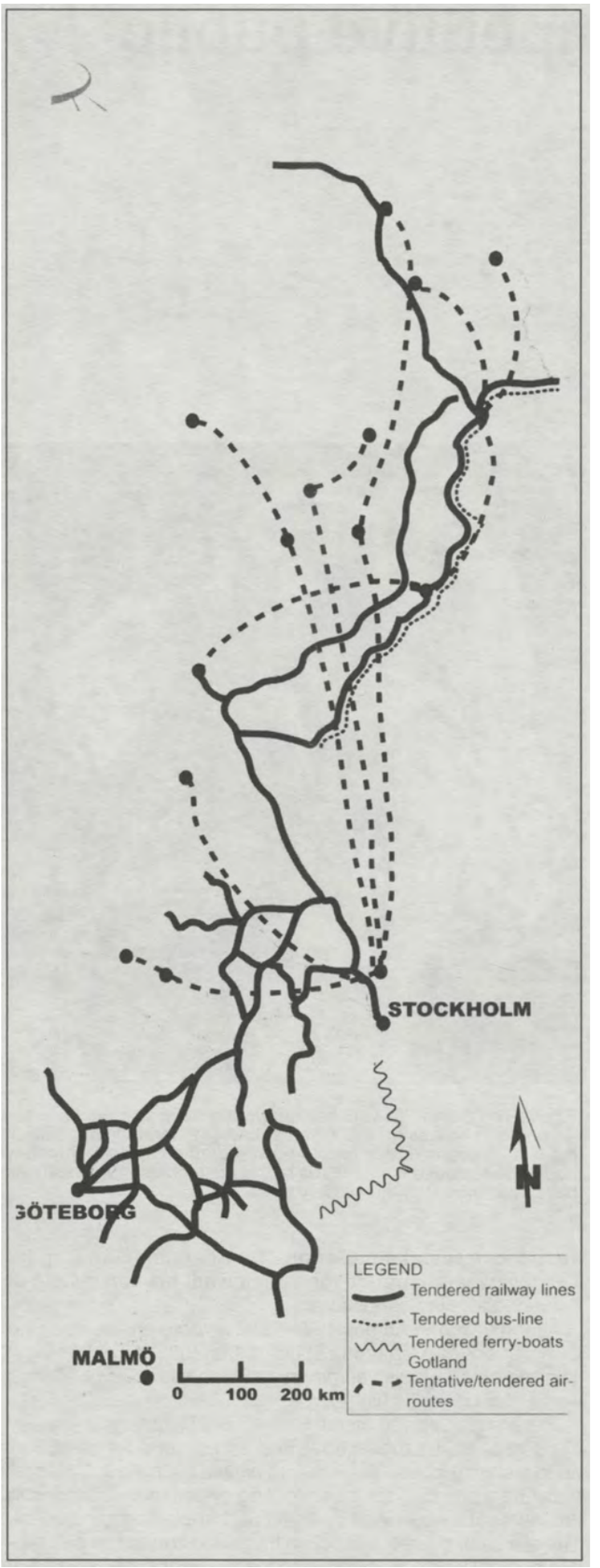


Fig. 3: Tendered lines by different modes of passenger transportation in Sweden.

and car-pooling systems. Today these ideas are developing rapidly in residential areas and towns in many parts of the World. They are also closely linked to Public Transport in the current concept of Mobility Management.

Through the 1980s and 1990s I worked with the Green Party in Sweden as Party Secretary, a deep experience in all aspects. The physical basis of Ekistics certainly has links to green thinking and a sustainable development of all human settlements and infrastructure.

After two decades of politics I have now, as Director-General of the Swedish National Public Transport Agency since 1999, focused once again on the interplay between transport and settlements as I did 30 years ago in my basic ekistic studies.

The link between ekistic analysis and public transport planning concern

Our authority is placed under the Ministry of Industry. Our duty is to tender passenger transport operations which would not be carried out on a commercial basis and we shall also make cooperation possible between different operators and different modes of transportation. Thus we differ from the only known authority in the European Union which has part of our duty. That is the Strategic Rail Authority in the UK which obviously only deals with tendering of rail service while we also tender bus, air and ferry boat service (fig. 3).

We are concerned with interregional and even cross-border transport while local authorities take responsibility for regional and local transport. The interregional focus makes my present-day map of Swedish interregional links a blueprint of my study in Athens 30 years ago! The further development of Central Place Theory by C.A. Doxiadis in his Ekistic Theory inspired me to study the pattern of regional centers in the southern and by far the most inhabited area of Sweden. The structure I found was the same as many regional scientists have also witnessed, and it is clearly a structure which certainly has to be understood and respected while developing interregional public transport service and making major investments in new infrastructure today (figs. 4 and 5).

Tendering and developing public transport

Tendering public transport operations is a well-known activity in many European regions. When it comes to the national scale, however, we see problems arising. These problems are mainly based in the culture of national monopolies for railway companies. Though a competitive culture is the aim of the European Union, especially France and Germany say their national railway companies, SNCF and DB, are rejecting proposals to change. The Commission has tried to put forward proposals for the railway sector and for "public service obligations" in passenger transport but to my knowledge these efforts have not progressed so far. If traffic jams and congestions are to be combatted efficiently, we certainly need more progressive thinking in the European passenger transport sector as a whole. Networks must be put together over ancient borders. A lot of work is certainly under way in the name of Trans-European Networks (TEN) and heading east in the Commission's process known as TINA (Transport Infrastructure Needs Assessment). We are, however, still waiting for a decisive political will to appear on the European scene if a radical change in the passenger transport sector is to be possible. The immense losses of environmental qualities, capital and human life due to inefficient traffic operations cannot prevail in a Europe which honors the idea of sustainability.

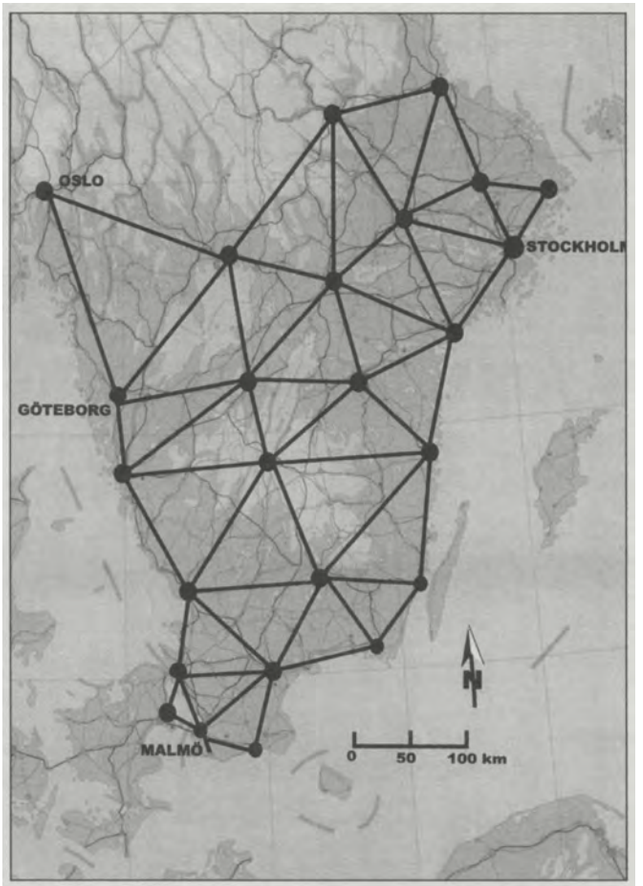


Fig. 4: "The Scandinavian Capital Triangle" study, as developed by the author in Athens at the Athens Center of Ekistics (*Source*: S-ACE:101:281/30.7.1972), analyzed links between major regional centers.

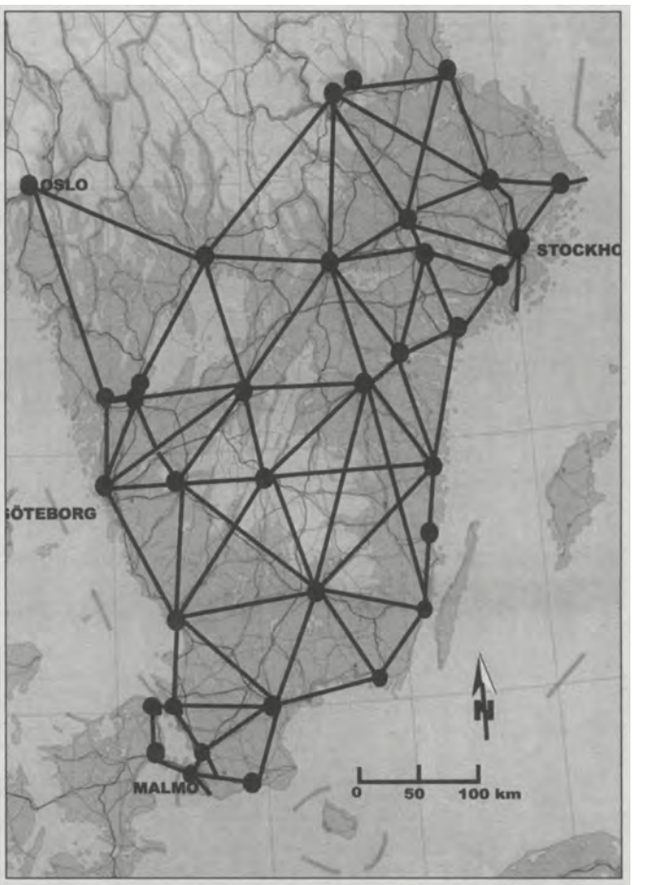


Fig. 5: Interregional Structure of Passenger Transport in south Sweden and adjacent areas, major links as conceived by the author in 2002.

Passenger transport in Sweden is basically provided on commercial terms and increasingly in a competitive environment. All former monopolies and government enterprises with exclusive rights have been restructured into limited liability companies operating solely on commercial terms. The Agency believes that well functioning competition in all fields of public transport will bring about modernization and development of the industry through new ideas, products and markets and that consumers will benefit from an increased variety of services. However, Sweden is relatively sparsely populated and there are regions with insufficient demand to form a basis for viable commercial traffic. The role of the Agency in this respect is to procure traffic services by public tender following Government approval. Ferry services to the island of Gotland, night trains to the northern part of Sweden, bus services along the northern coast and regular air routes from small inland municipalities to Stockholm are current examples of such tendering (see fig. 3). Tendering proposals are based upon traffic and bottleneck analysis as well as an assessment of alternative means of transport and their accessibility. So far the Agency considers public tendering to be the single most important tool at its disposal to achieve the overall policy aims.

In its long-term vision the Agency foresees a transport market that forms a natural part of people's daily life and where the extent, quality and flexibility of the passenger transport system makes it the main alternative for increasing numbers of people. The Swedish Parliament has, furthermore, decided that all public transport vehicles, platforms and terminals shall be fully accessible to everybody regardless of any form of disability before 2010. This is of course a great challenge for the entire passenger transport market.

Future – a Pan-European, competitive public transport system

A combination of ekistically based understanding of the structure of settlements and the digital revolution that opens the way for smart ticketing, booking and information is needed to enhance the efficiency of the public transport sector.

More travelling is made over regional and national borders which calls for international solutions. In the Nordic countries a so-called Universal Travel Card Standard is under way. Hopefully you will soon be able to travel by all kinds of transport modes between most destinations by means of a little travel chip that gives you an open access and easy payment. Taking into consideration that this digitally powered service is relatively cheap, it will be possible to expand the public transit market and subsequently bring about a deeper understanding of the benefits of heavy investments in new transport infrastructure.

A coherent public transport system cannot develop within national frameworks but must expand over all borders so that the individual feels free to travel from any origin to any destination. This is the way to challenge extensive automobilism, that is, simply to provide a better, faster, safer, cheaper, more comfortable and accessible system than the traditional private car-ownership.

Symposion: Defining Success of the City in the 21st Century

Part 7: Education and Research

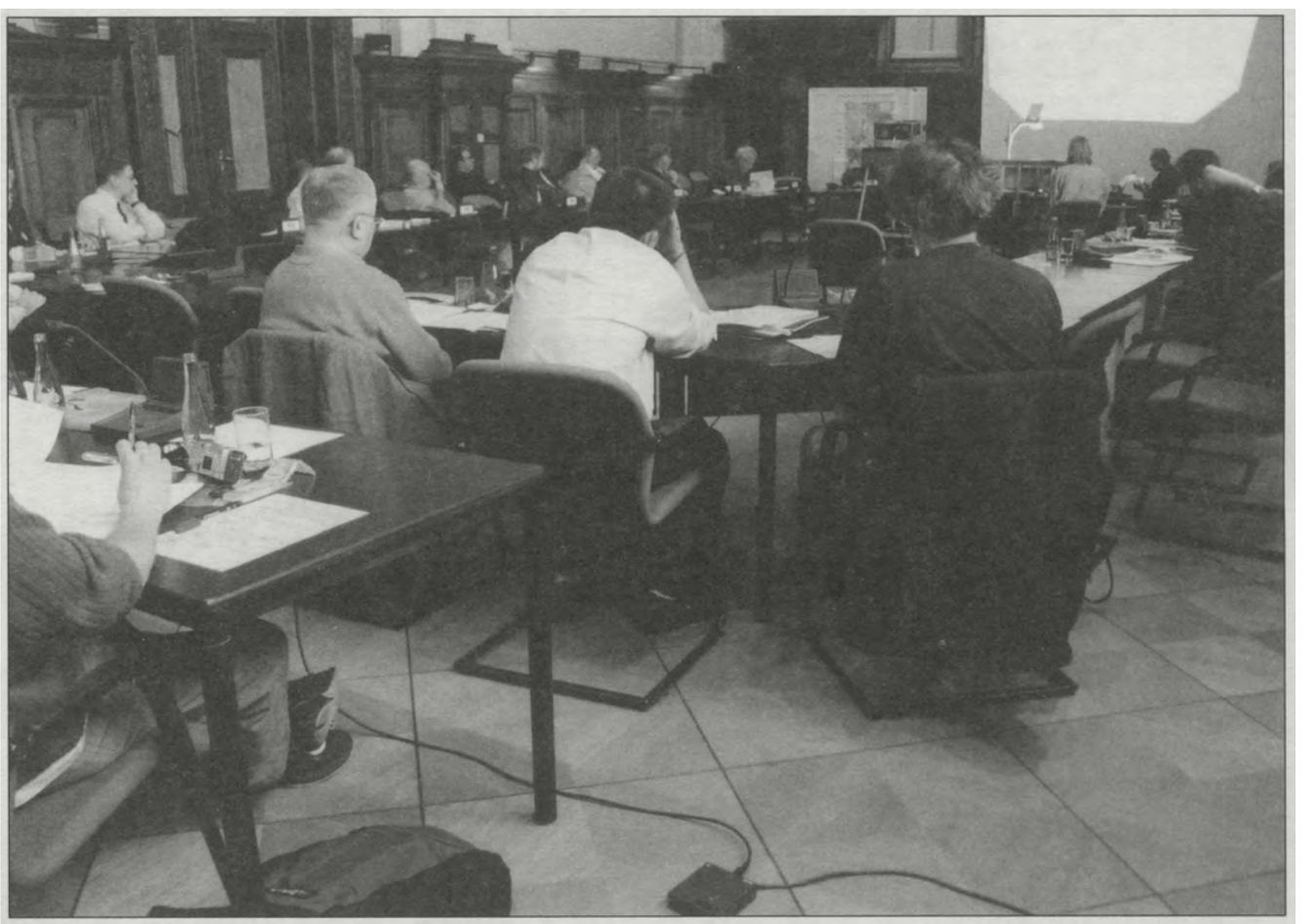
Chairman : **Demosthenes Agrafiotis***

Presentations : **Wu Liangyong; Thomas W. Fookes; David Johns, Ian Munro, Aimee Redknap and Sarah Ricketts**

Contributions : **Francis M. Mburu**

Discussion* : **Alexander Papageorgiou-Venetas, Mao Qizhi, Alvaro Uribe, Mit Mitropoulos, Kjell Dahlström**

***No written record exists of any statement made during the sessions.**



Ekistics, 415, July/August 2002
416, September/October 2002
417, November/December 2002

Sciences of human settlements: Searching for the theory and practice

Wu Liangyong

The author is Professor of Architecture and Urban Studies, Tsinghua University, Beijing, People's Republic of China; member of the Chinese Academy of Sciences; member of the Chinese Academy of Engineering; and Director of both the Institute of Architectural and Urban Studies and the Center for Human Settlements, Tsinghua University. He is also a member and former President of the World Society for Ekistics (WSE). The text that follows is a slightly edited and revised version of a paper presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

The science of human settlements in the world

Since C.A. Doxiadis advanced the theory of Ekistics with the ending of World War II, the theory and practice of the Science of Human Settlements has been developed over the world. The UN Habitat I Conference in Vancouver in 1976, the Rio Conference in 1992, the UN Habitat II Conference in Istanbul in 1996, as well as other worldwide actions up to the UN Special Conference of Istanbul+5 in June 2001, have marked an unceasing progress of research in this field; and the new concepts of Human Settlements, *Habitat*, cities in a Globalizing World, emerging in consequence of the research progress, have become the global guidelines for building a sustainable world. Today the sustainable development of Human Settlements has become a common theme all over the world and thus architecture and urban planning have been ushered into a broad realm of multidisciplinary co-operation for further development.

Taking into consideration all the current changes, we hereby advocate developing the Sciences of Human Settlements in a more comprehensive way. That means establishing communities of science, encouraging collective work and multidisciplinary communication among all the participants, and searching for the theory and approach of the new paradigm.

Recent rural and urban development in China

It is well known that great changes have taken place in China in the past two decades which can be seen not only at any geographical dimension but also in all socio-economic aspects: politics, economy, culture, science and technology. Both economic development and urbanization have stepped into an accelerating phase, leading to a great annual growth of GDP and urban population (figs. 1 and 2). Amidst magnificent achievements, there have emerged some complicated problems. The crux is that the cities and the countryside are developing at such a rapid rate, on such a large scale, with such enor-

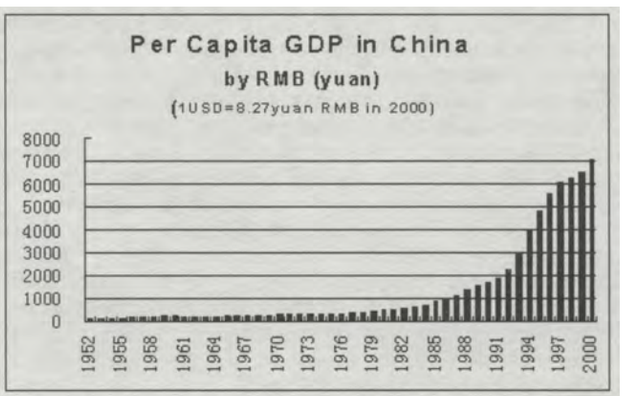


Fig. 1: Per capita GDP in China by RMB (yuan) (US$1.00 = 8.27 yuan RMB in 2000).

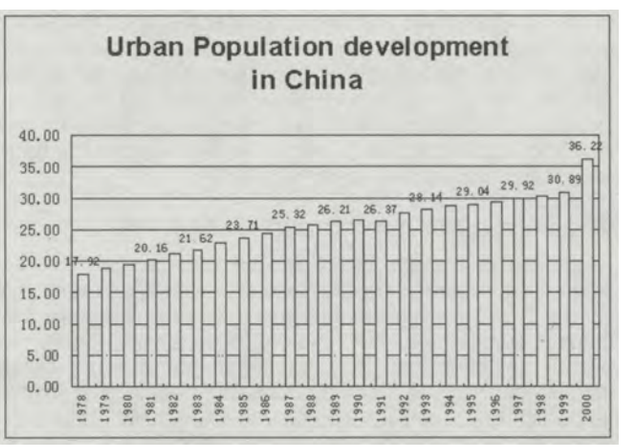


Fig. 2: Urban population development in China.

mous capital, to such a vast extent, that they have surpassed any historical period that the country has ever witnessed before. Building construction has today virtually become a major economic pursuit in China.

In the transition from a planned economy to a market economy, China has found her way in accordance with the specific conditions of the country: the socialist market economy which overemphasizes neither the plan nor the market at the expense of the other. It means that general plans are still necessary, perhaps even more necessary than before, in the course of this rapid growth. To ensure the sustained development of China in the future, we should carry out holistic research, search for the general strategies and lay out common guidelines. In terms of urbanization, we should in particular study integrated rural and urban development from the regional viewpoints in the hope that the cities and the countryside will advance side by side and the various regional cultures will co-exist.

Theorized progress at the Center for Science of Human Settlements of Tsinghua University

Aware of the seriousness of the issues and conscious of the adoption of a scientific approach, I have devoted myself to search for the theory of Science of Human Settlements in China in the past decades with a series of academic publications including *A General Theory of Architecture* in 1989. In 1993, together with my colleagues I put forward a proposal to set up the Sciences of Human Settlements at the annual conference of Science and Technology Division of the Chinese Academy of Sciences. In order to tackle the problems existing in China's rural and urban construction, we have tried to build up a new science focusing on coordination between man and nature, with the living environment as the major object of study. We have made explorations from various aspects.

Founded in November 1995, the Center for Science of Human Settlements (CSHS) of Tsinghua University has offered a course on "Brief Introduction to Sciences of Human Settlements," and since 1998 has published the "Series on Sciences of Human Settlements" and has made considerable progress in the research field. The steady process has marked a good beginning in a field of bright prospects.

Recently, I published a book entitled *Introduction to Sciences of Human Settlements*, which mainly explores the relationship between humans and environments, also with a view of the way out for human settlements in China. The book is divided into two parts. The first part introduces the origins of the Science of Human Settlements, its constitutions, its basic ideas, its methodologies and some case studies that have been carried out by the CSHS in the course of many years' research work on the conservation and development of sustainable human settlements. The second part is on C.A. Doxiadis and Ekistics, which functions as an interpretation and review of the theories of Ekistics. The highlights of the book can be summed up as follows.

The connotation of human settlement

As the research object of the Sciences of Human Settlements, a human settlement is firstly a place where people come to live and have built homes. It functions as the base where people manage to make their life in nature. Man is undoubtedly the core of the settlements, thus the primary purpose for building the settlements is to meet the demand of humans to live together in communities. According to the density of the residents and the degree of their impact on nature, a human settlement can be divided into two parts in terms of physical space: the ecological environment and the manmade environment. During the long history of the evolution of human settlements, the harmonization of Man with Nature has always been the ideal of mankind, though the specific building actions differed greatly from each other under the influences of natural and social factors.

In detail, the human settlement is composed of five systems: Nature, Man, Society, Habitation and Network, among which the first two systems are most essential while the last two systems are also indispensable in terms of the construction of physical environment. The relationship between the human settlement and its five systems is like that between the whole and the parts. Therefore the achievement of a better human settlement does not lie in the perfection of its systems in part, but in the integration of them; and a better human settlement should be not only an ecological environment but also a humanistic one which can meet the demands of mankind as both biological and social individuals.

As a complex system, the human settlement involves all kinds of settlements on the earth, from a room, a village to a town, a city, even to the whole world. According to their scale, they can be categorized into five levels: the global, region, city, community and shell. This categorization is very helpful in clarifying some basic concepts in the research of the Sciences of Human Settlements and in setting up acceptable standards for research at different levels.

The main purpose in promoting the Sciences of Human Settlements in China today is to try to adapt the large-scale constructions to the current circumstances. It suggests that research works should be carried out not only in the academic field to find out the law of the development but also in the practical field to guide the construction of human settlements that takes place every day and everywhere. As stated above, a better human settlement, composed of five systems, should be such an integrity of all its parts that the demands of different aspects would be well satisfied: ecology, economy, science-technology, society, culture-art, etc. From that point of view and with regard to the specific case of China, five principles are proposed herewith as the guidelines for the construction of human settlements in China: respect for nature by awakening the ecological awareness of the public and tackling environmental issues; the sound circle between the construction of human settlements and economic development; the prosperity of society promoted by the progress of science and technology; the concerns for the interests of people in terms of individuals as well as of society as a whole; and the integration of the pursuit of science and the creation of art (fig. 3).

The framework of the Sciences of Human Settlements

Taking living environments as a research object, by the Sciences of Human Settlements, dealing in a comprehensive way with all the problems occurring during the development of human settlements, we indicate not a mono-discipline but a multi-disciplinary one which involves the sciences of nature, technology, humanities and so on. It implies that, with the common goal to build an ideal human environment for human beings, all the disciplines concerned with the construction and development of human settlements are regrouped in one framework, centering the trinity of architecture, landscape architecture and urban planning that work as the leading disciplines.

As the integrity of different disciplines, by the Sciences of Human Settlements we mean an adaptive open system which changes unceasingly. The number of the disciplines concerned in the framework may increase or decrease while their importance may also vary from time to time. All the disciplines

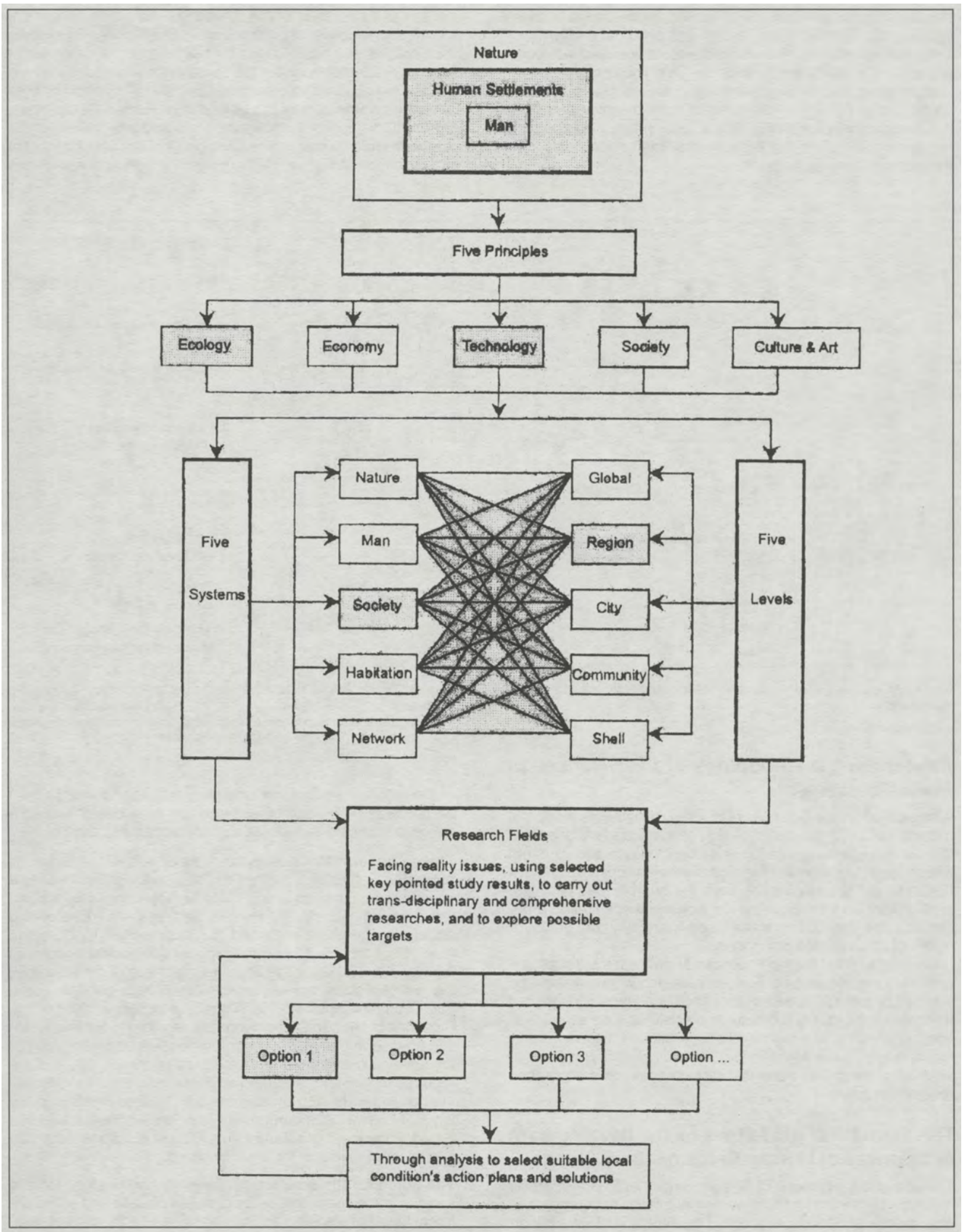


Fig. 3: Framework of the Science of Human Settlements Studies.

should not be equated but one or more than one should be highlighted when it is necessary to deal with practical problems.

By the Sciences of Human Settlements we advocate comprehensive, systematic research on human settlements in various aspects. On the one hand, the research works could be carried out at any of the five levels of human settlements from the disciplinary perceptions; on the other hand, they could be focused on any of the five systems of human settlements from the regional viewpoints (fig. 4).

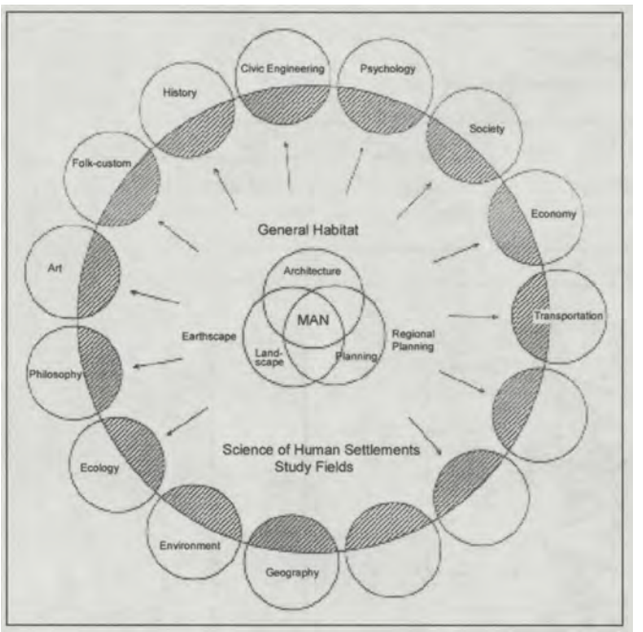


Fig. 4: An opening and creative system of the Science of Human Settlements.

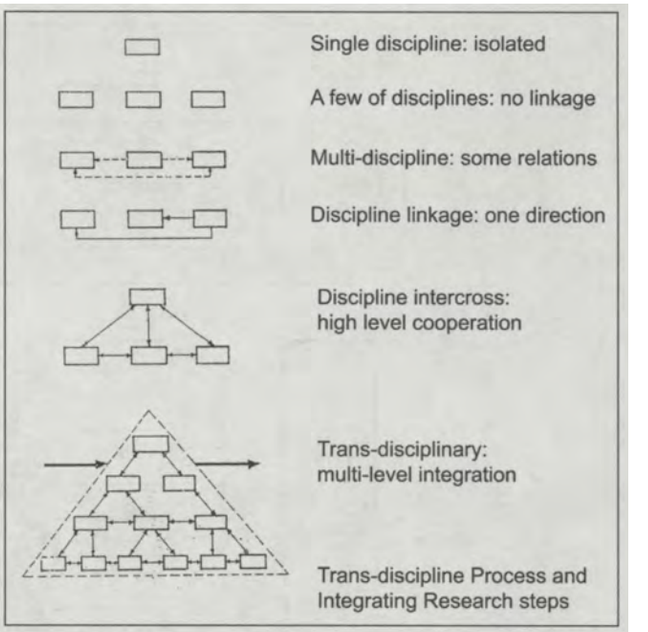


Fig. 5: From single discipline to "Trans-disciplinary Integrating Research." (*Source:* Erich Jantsch, "Inter- and transdisciplinary university: a systems approach to education and innovation," *Ekistics,* vol. 32, no. 193 (December 1971), pp. 430-437).

Researching methodology of the Sciences of Human Settlements

When we talk of the Sciences of Human Settlements we do not mean an all-powerful discipline that can reach every aspect of the human environment. It is a complex adaptive system whose feasible method in practice is problem-oriented. It says firstly dig out the key issues from the complicated realities, then channel out the possible solutions to these limited problems by integrating, in a trans-disciplinary way, the achievements of other related disciplines.

From figure 5 it is easy to understand how the trans-disciplinary approach was developed. For any research works, it could be stepped by a single-isolated discipline, or a few disciplines but without linkage; then, by multiple disciplines with some relations; afterwards, in a high level cooperation of discipline intercross; finally, it will develop into trans-disciplinary with multi-level integration, and trans-discipline process and integrating research steps.

The theoretical guidelines to the development of Sciences of Human Settlements in China

The use of the Sciences of Human Settlements is a strategic research significant for the development of the economy, society, science and technology of the country; it is always important to put forward a research schedule appropriate to the realistic occasion. Using as a basis the sustained studies of human settlements in China, I have preliminarily summed up, in my new publication *Introduction to Sciences of Human Settlements*, the basic issues for our research of Sciences of Human Settlements under the current circumstances. It concerns the coordinative organization of the different disciplines within the framework of the Sciences of Human Settlements, the multi-disciplinary communication and integration of the concerned disciplines, the realistic goals of the development of the Sciences of Human Settlements, the practical application of the theories and methodologies of the Sciences of Human Settlements in the fields of research, planning, design and education concerning the construction of human settlements.

The guide for methodology: Just as we regard the Sciences of Human Settlements, composed of different disciplines, as a complex open system which could be approached by a problem-oriented method, the Human Settlement, a multi-leveled structure, should be regarded and approached in the same way. Especially in China, the biggest developing country of the world that is now in the accelerating phase of development, the problem of human settlements can only be dealt with as a huge, complex, open system. Thus researchers working on the Sciences of Human Settlements are required to have a scientific philosophic thinking, a comprehensive understanding of the science of system and the science of complexity, and are required to master the trans-disciplinary and problem-oriented method to tackle step by step the complicated practical problems. Meanwhile, a community of science should be established, composed of scientists of different disciplines devoted to sustained research for the new paradigms.

The guide for the practice of planning and design: Holistic thinking is indispensable in the different phases and at the different levels of planning and design. The new theories of planning and design can only be worked out by integrating the various existing ones. Exactly speaking, at the level of architec-

tural design, the theory of General Architecture should be encouraged to return architectural creations to the basics. At the level of urban design, the new concept of human settlements would lead to the harmony of the physical spaces by respecting the perceptions of region, city, community and building. At the level of general planning and design of human settlements, a new dynamic notion of time and space should be set up to reach the harmonization of time, space and human beings.

The guide for professional education: Architectural, landscape and planning education should be reformed and adapted to the new context to provide society with the new type of qualified personnel who are capable of carrying out trans-disciplinary research works and integrating science, humanity and art. In this view, the training of "professional leadership" and the popularization of the Sciences of Human Settlements would be the key points in future education.

The practices at the Center for Science of Human Settlements of Tsinghua University

Concerning the advocacy of the Sciences of Human Settlements in China, a considerable number of research works have been done by Tsinghua University in the past half century, especially in the past 20 years after the economic and political reforms of China. The problem-oriented analysis, the historical and regional study and the multi-disciplinary reference have served as the main methods for the CSHS.

Holistic thinking is the philosophy of the CSHS's planning and design practices. It means that when dealing with a specific project, we always approach it as a part in the whole, as a period in the time sequence and as an element in the spatial system, and the solution is the result of the integration of the past and the future, the element and the entity, the personality and the harmony.

In accordance with our experiences in the research of Sciences of Human Settlements, the following factors are indispensable for success:

- The establishment of innovative and industrious academic groups;
- The spirit of cooperation and practical and realistic attitude of the participants;
- The advance of common academic guidelines, academic theories, developmental stratagems and working methods;
- The organization of research groups, directed by high-level academic leaders, which are made up of a combination of the old, the middle-aged and the young;
- The promotion of practical problems which it is urgent to tackle.

Regional studies

• *Sustainable Development of Human Settlements in the Northwest Area of Yunnan Province.* This is a collaborative research between the provincial government of Yunnan and Tsinghua University, which involved the School of Architecture of Tsinghua University and several local institutes of Yunnan Province. The Northwest Area of Yunnan is distinguished by its richness of ecological and cultural diversities, while suffering from the fragility of environment and the backwardness of economic development. Aiming at improving the living environment of the local people, we searched for the potentiality to accelerate the pace of local economic development yet to better preserve the regional feature of ecological and cultural diversities. Some constructive propositions were made:

- to coordinate ecological preservation with socio-economic development by setting up a regional network of preservation of ecological diversity;
- to encourage the development of tourism and related service industries as the key to promoting the local economy;
- to consciously conserve the diversity of regional cultures under the pressure of economic growth;
- to ameliorate the planning, construction and governance of the living environment.

Finished in 1999, the research achieved such success that all the proposals were accepted by the local government and some of them were even applied.

• *Spatial Development of the Region of Greater Beijing.* As one of the most important regional studies in China, this research work was done in the past two years, involving more than ten research institutes of different cities and hundreds of specialists of different disciplines. It is a successful experiment of the Sciences of Human Settlements in the practical field with the application of the problem-oriented method, the trans-disciplinary communication, the collective work of Community of Science, the holistic thinking, the Science of Complexity, etc. The research object concerns the territory of the Municipalities of Beijing and Tianjin and the northern part of Hebei Province. With reference to the experiences of other countries, we approached the region from the global point of view in the following aspects: strategic role, regional function, spatial layout and mechanism of coordination and cooperation. Based on the deep-going analysis of the current situation of the region, the spatial development of Greater Beijing was restructured, aiming at the emergence of a prosperous world city.

- Combination of organic disposal and rational regroupment in a regional dimension. It means gradually relocating certain urban functions of the core-cities like Beijing and Tianjin to other cities and greatly encouraging the growth of middle-sized cities to transform Greater Beijing from a mono-centered region to a multi-centered city-region.
- Macro-control over the actions of land use from the regional level. Forests, agricultural lands and ecological areas are defined as preservation areas or non-development areas while the comprehensive remanagement of the valleys is considered an important step to ameliorate the regional environment.
- Regional cooperation in terms of the construction of multi-level and multi-functional transportation network. The radial-concentrated pattern should be transformed to a densified network centering two cores with Tianjin being treated as another hub of regional, national and international communication besides Beijing.
- Prototype of Transportation Corridor + Urban Cluster + Ecological Network. It is suggested that the new urban growth should be reorganized in urban clusters of reasonable size, interrupted by ecological green lands, along several transportation corridors.
- Enhancement of regional governance and establishment of cooperative and coordinative mechanism. Regional organizations composed of the concerned departments of the central and local governments should be set up to implement permanent control over regional growth, while special committees should be set up to deal with the key issues in the construction of human settlements, such as the regional network of transportation, the preservation of water resources, the amelioration of the regional environment, the restructuring of the regional economy, and so on.

Projects of urban planning and design

• As case studies in the research of *Sustainable Development of Human Settlements in the Northwest Area of Yunnan Prov-*

ince, several practical projects were done in Zhongdian County, including the Master Plan of Zhongdian County, the Urban Design of the Town Center of Zhongdian and the Preservation Plan of Jiantang Town in Zhongdian. The former has already been approved by the provincial government and was implemented at the end of 2000.

- Evaluation of the Master Plan of the New Area of Suzhou and Detailed Plan for Recent Actions, a project commissioned by the local government, which has been approved by the professional committee of experts.

Projects of architectural design

- Central Academy of Fine Arts. The project concerned the planning of the campus and the architectural design of 95,000 sq.m. Named as one of the Ten Best Projects of Planning and Design of Beijing in 1996, this project was finished in autumn 2001 and has already been put to use.
- Beijing Diaoyutai State Guesthouse. This site planning and design project was approved by the state government in 2000. Based on the project, a building number 19 architectural design scheme of 16,000 sq.m has been completed.
- Institute of Confucius. Commissioned by the city government and Committee of Preservation of Cultural Relics of Qufu, this project deals with the conception of an architectural complex of 12,000 sq.m. As one of the key projects in Shandong Province, the first phase of construction was finished and the building was put to use in 1999.
- Ecological Village in the city of Zhangjiagang. This is an international collaborative project with the Building and Social Housing Foundation of the UK and the local government of Zhangjiagang. Two houses were constructed in 2000 and the environmental evaluation was done in 2001.
- Beijing Housing 2000. This international collaborative project with our Korean colleagues is associated with the research of *Spatial Development of the Region of Greater Beijing*. Exemplary designs have been done in terms of housing rehabilitation and new housing prototype and the results were exhibited in Beijing in March 2001.

Conclusion

In 1993, based on the development situation, we screwed up our courage to set up the concept of the Science of Human Settlements. Seven years later, this concept has been widely accepted in China and also in the world.

Just at the moment that we are starting the WSE 2001 Annual Meeting in Berlin, another conference on Chinese Human Settlements Development is opening in Beijing. This means that the Science of Human Settlements is the focus of attention in the world now and has reached the academic front line with unlimited prospects for the future.

Today, the great rural-urban development sees unprecedented progress in China and its scale and extent stands first in the world. The achievements lead us to think and research the Science of Human Settlements even self-consciously. We should maintain the progress continuously and guide development on the proper route, and search for a new paradigm of tomorrow.

The need for a contribution of ekistics to planning education and research

Thomas W. Fookes

Dr Fookes is an Associate Professor in the Planning Department, University of Auckland, New Zealand. He has worked variously through the past 36 years as a geographer-planner, academic, environmental impact assessor, policy analyst, and professional planner. A defining moment in his career path was the two years spent as a student with C.A. Doxiadis at the Athens Center of Ekistics in Greece. As a consequence he has carried through the principles and practices developed in Athens into his professional life. Dr Fookes is leading research and development on Ekistics in Education in the Planning Department, and he is currently a Vice-President of the World Society for Ekistics (WSE). The text that follows is a revised and edited version of a paper he presented at the WSE Symposion "Defining Success of the City in the 21st century," Berlin, 24-28 October, 2001 as a report of the Ekistics Education Model Project as proposed by the author at the Athens 1999 WSE meeting.

Foreword

The object of the project is to provide an answer to the question, "How can we go about teaching Ekistics in our discipline?" The rationale is that the WSE needs to provide leadership through examples if Ekistic Education is to flourish.

Ekistics Education Model Project

- **A case study:** An initial case study is from the Bachelor of Planning (BPlan) course "Settlement Planning" (or Planning 200) at the University of Auckland. The course is structured as follows:
  - First half (6 weeks) focuses on Ekistic theory and practice. This is based on two teaching manuals which are collections of Doxiadis' work and the Urban Detroit Area Study (practice case study).
  - Second half (6 weeks) teaches current theory and practice for a "compare & contrast" (e.g. Sustainability; Smart Cities). For further details, the reader may refer to the website: www.planning.auckland.ac.nz/research.
- **Generalizations of feedback from WSE members:** Since the EEM project began in 1999, comments have been received from WSE members. They include the following:
  - "Ekistics may have some uses but it needs to be brought up to the present"
  - "A good project – I use aspects in my architecture teaching but not all of Doxiadis' ideas"
  - "Hope it is not a slavish acceptance – there is some good and bad stuff to think about."
- **Further work:** To date, the contribution in terms of examples, of course, has only come from one source, the University of Auckland. It follows, therefore, that we have a need for more course examples concerning:
  - a range of disciplines
  - lecture and studio/practical modes, and
  - teaching about ekistics theory and practice that leads to research.

Ekistics theory and practice research

The draft of a paper to be presented later at the Southern Crossings Conference (2002) formed the basis of the research section for this paper. It was intended that at Berlin it could provide a preliminary research agenda. As such it is based on some exploratory work being done by this author on themes connecting the writing of Arnold Toynbee and C.A. Doxiadis. This work has suggested a possible research agenda.

The balance of this paper is based on extracts from the draft of the Southern Crossings paper.

Toynbee and Ekistics

The foundation of this paper is work by Arnold Toynbee dating between 1967 (*Cities of Destiny*) and 1970 (*Cities on the Move*).[3] The intention is to look back at the themes developed in those works and to examine how they may be applicable to the issues of cities for the 21st century. The nexus for this analysis of the ideas drawn from the past and projected into the future is Ekistics, the Science of Human Settlements. Ekistics has been chosen because it was a contemporary influence on Toynbee's thinking due to his association with Constantinos A. Doxiadis and the World Society for Ekistics. By drawing together the principal theory and practice developed within Ekistics as a transdisciplinary initiative, and Toynbee's interpretations in relation to the historical and contemporary city, the paper attempts to identify a strategic synergy that the whole is greater than the sum of its parts which can be applied to a scenario for the 21st century city in the context of globalization.

Themes

From *Cities on the Move* one can identify some themes that address what Toynbee calls the "material" aspects of the city:

- Cities and food production
- The City and import-export flows

- Accessibility and security
- City walls and their equivalent in the contemporary city
- Density
- Movement

These issues are drawn from his chapter titled "The traditional city and the present urban explosion." In his earlier *Cities of Destiny* Toynbee has assembled samples of historic cities categorized under the headings of "The City-State," "Capital Cities," and "Megalopolis." These groups of cities later provided the structure for *Cities on the Move*. Thinking of the city in the future (or the city of the future) Toynbee turns to the world-city concept that has become a central feature of Ekistics. Within this concept he places two themes:

- Science spreads the world-city; and,
- Man at the mercy of his creations.

A full description of these themes can be found in the published *Proceedings* for the Southern Crossings Conference.[2]

Some comment is required of these themes developed by Toynbee:

- Firstly, it is naïve to think that a selected number of themes developed by Toynbee in the 1960s would be likely to capture themes relevant to a consideration of the city for the 21st century. This is especially so given that today we are thinking specifically of cities in the context of sustainability, and this was not an explicit feature of urban thinking in the 1960s.
- Secondly, the analysis has had to be generous in its interpretation of the meanings given to the themes when viewed in today's terms, for example, "walls and equivalent."

There is still a direction that helps us picture the coming century.

Synthesis — Sustainable city

By taking each of Toynbee's themes and considering them across each of the ekistic elements in turn, it is possible to develop a synthesis of each theme *in so far as they relate to the sustainable city* (fig. 1).

A further step in this synthesis process is to then consider each of the rows in figure 1 for an integrated statement that could be called a Vision for the 21st century sustainable city, along the lines of:

> "A community-centred city where wise land use and environmental space concepts are applied with humanist science, urban design and movement systems to achieve the benefits of human scale at ekistic units 1-8, and efficient public movement systems beyond ekistic unit 8, while enabling people to retain a sense of personal independence, well-being, a collective quality of life, and maintaining quality ecosystems" (TOYNBEE, 1970).

Concluding remarks

It has been suggested above that it would "be naive to think that a selected number of themes developed by Toynbee in the 1960s would be likely to capture themes relevant to a consideration of the city for the 21st century." This was justified by the comment, "This is especially so given that today we are thinking specifically of cities in the context of sustainability, and this was not an explicit feature of urban thinking in the 1960s."

It is somewhat surprising, therefore, to look at figure 1 and see how relevant Toynbee's themes seem to be. While the analysis has had to be generous in its interpretation of the meanings given to the themes when viewed in today's terms, for example, "walls and equivalent," there is still a direction that helps us picture the coming century.

What is useful is the way our minds can be focused on the aspects of the sustainable city that are introduced through Toynbee's themes. This is not so much as a concluding position but one where a continuing agenda can be drawn from the synthesis to encourage research to expand our thinking. The structure of this agenda could be as illustrated by figure 2.

Themes Sustainable City	
Cities and food production	Community-focused basic food production with an ethic of "wise land use"
Import-export flows	Provide an economy that balances its import-export needs consistent with the concept of "environmental space" (CARLEY and SPAPENS, 1998)[4]
Accessibility and security	Attend to accessibility and security issues at the level of each ekistic unit
Walls and equivalent	Continue the traditional practice of applying walls and their 21st century equivalents to contain and secure sensitive social and ecological environments
Density	Provide for increasing densities while recognizing the contributions of the five ekistic elements and their interactions
Movement	Recognize the hierarchical and semi-lattice structures of movement systems and the need for these to be scaled to the appropriate ekistic unit level
Science and city spread	Match the needs of a sustainable city with the appropriate applications of science to control city spread
Technological dependence	Ensure the sustainable city benefits from technology while enabling its inhabitants to maintain their own sense of independence and well-being

Fig. 1: Synthesis by Toynbee's themes.

Towards a strategic synergy of action

It is at this stage that questions can be asked that pick up Doxiadis' matrix that relates issues of Desirability and Feasibility to the range of aspects used in Ekistics: economic (E), social (S), political (P), technological (T), and cultural (C) (fig. 2).

This matrix provides a basis for developing a strategic synergy of action. By this is meant, thinking strategically about how we can achieve an integration of the parts of the system outline in order to achieve the principle that "the whole is equal to the sum of its parts."

Each of the Sustainable City Research Themes can now be examined systematically according to whether they are desirable and feasible for the 21st century city, considering economic, social, political, technological and cultural criteria. Pursuing this research model should produce a robust direction of enquiry informed by the past, and carry the ideas introduced by Toynbee and Doxiadis into urban analysis for the 21st century.

Further work is proposed to extend these ideas through ekistic research which is to be discussed at the 2001 General Assembly of WSE members in Berlin.

Sustainable city research themes	Desirability					Feasibility				
	E	S	P	T	C	E	S	P	T	C
Community-focused basic food production with an ethic of "wise land use"										
Provide an economy that balances its import-export needs consistent with the concept of "environmental space" (CARLEY and SPAPENS, 1998)[4]										
Attend to accessibility and security issues at the level of each ekistic unit										
Continue the traditional practice of applying walls and their 21st century equivalents to contain and secure sensitive social and ecological environments										
Provide for increasing densities while recognizing the contributions of the five ekistic elements and their interactions										
Recognize the hierarchical and semi-lattice structures of movement systems and the need for these to be scaled to the appropriate ekistic unit level										
Match the needs of a sustainable city with the appropriate applications of science to control city spread										
Ensure the sustainable city benefits from technology while enabling its inhabitants to maintain their own sense of independence and well-being										

Fig. 2: A Research Agenda for the Sustainable City focused on Desirability and Feasibility.

MASTER SHEET: THE EKISTICS FRAMEWORK

SUB-THEME: NATURE: GOOD USE, PROTECTION AND IMPROVEMENT OF NATURAL ELEMENTS
AUTHOR'S NAME: **CONTRIBUTION TITLE:**

	ANTHROPOS	ROOM	HOUSE	HOUSE GROUP	SMALL NEIGHBORHOOD	NEIGHBORHOOD	SMALL POLIS	POLIS	SMALL METROPOLIS	METROPOLIS	SMALL MEGALOPOLIS	MEGALOPOLIS	SMALL EPEROPOLIS	EPEROPOLIS	ECUMENOPLOIS	PAST	PRESENT	FUTURE	DESIRABILITY	FEASIBILITY
Criteria for Environmental Assessment																				
Climate																				
Habitability																				
Utilisation of resources																				
Flora and Fauna																				
Landscape																				
POPULATION	1	2	4	40	250	1.5T	9T	50T	300T	2M	14M	100M	700M	5TM	50TM					

Fig. 3: Recording sheet for the Planning students from the University of Auckland, New Zealand.

Notes

1. T.W. Fookes, "World Society for Ekistics Project Proposal: Ekistic Education Models for contributing disciplines and professions," paper presented to the WSE meeting in Prague, 21-25 June, 2000.
2. See T.W. Fookes, "Ekistics and Arnold Toynbee's historical analysis of cities: Their applicability to the 21st century city," in E. Haarhoff et al. (eds.), *Proceedings for the Sixth Australasian Urban History/Planning History Conference*, Feb. 13-16, 2002 University of Auckland, pp. 231-248.
3. Arnold Toynbee (1970), *Cities on the Move* (London, Oxford University Press); Arnold Toynbee (ed.) (1967), *Cities of Destiny* (London, Thames and Hudson).
4. Michael Carley and Philippe Spapens, *Sharing the World: Sustainable Living and Global Equity in the 21st Century* (London, Earthscan, 1998).

Maungarei-o-Tamaki in 2050 – A town within a city

David Johns, Ian Munro, Aimee Redknap and Sarah Ricketts

The authors are Bachelor of Planning students at the University of Auckland, New Zealand. The text that follows is the summary of a presentation made by all four authors in a special session on Education and Research at the World Society for Ekistics Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

This project was undertaken by Bachelor of Planning students of the University of Auckland, in conjunction with a stage II studio class. The project is a strategic policy-making exercise, and involves using the ekistic methodology to highlight specific objectives and policies for a possible future town scenario in 2050.

The project first describes the context of our study in the Auckland region. Then key regional and local strategies are discussed in relation to the planned polis of Maungarei-o-Tamaki. Principles are drawn from ekistics and current regional and local strategies, in order to highlight the key themes that are to be discussed. Conclusions are then outlined in 2050 by an overriding synthesis of safety.

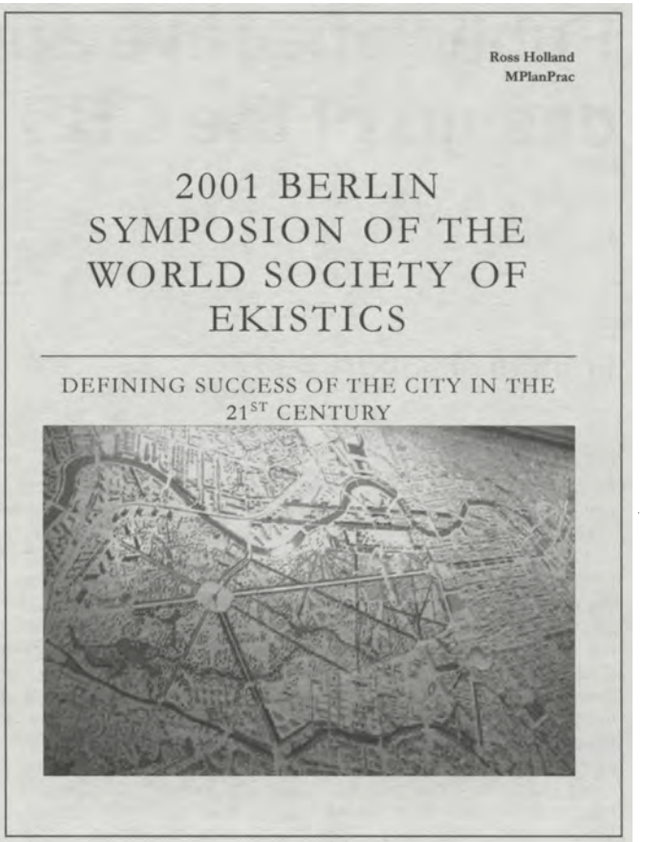
Maungarei-o-Tamaki is located in the Eastern strategic growth management area of Auckland city. Situated around the town are other towns, Glen Innes, Balmoral, and Panmure. The Auckland Regional Growth Strategy has highlighted this area as the next in line for intensification. The Liveable Community strategy describes the methods and values of future growth in Auckland. A main pattern emerging from these documents is how transportation corridors are to be used as the central nodes of future growth. The Maungarei-o-Tamaki area has an unused green corridor that is available for a future strategic road corridor. Running parallel to this is the Eastern rail corridor. This provides many opportunities to integrate the polis with the nearby central business district, and the wider Auckland region.

The project has many benefits for future intensification due to the central location of a redundant quarry that can be used for green field development. Other opportunities are through the existing educational facilities of the Tamaki University Campus. This campus aims to be a predominantly postgraduate graduate university, amalgamating crown research institutes with youth education. The area has to accommodate growth for an expected 70 percent increase in residents from approximately 10,000 to 20-30,000. A major issue here is to focus local movement on non-vehicular means, reducing environmental degradation by the unsustainable use of the private car, and efficiently moving a large population through the urban fabric of the local area, while still maintaining passenger transport connections to the wider Auckland region.

This highlights our first major theme of mixed use and housing where a range of methods are talked about, highlighting the need for mixed-use residential developments. This is then expanded upon in the second theme, which focuses on mixed-use development and the provision of open space within the desired 800 m pedestrian nodes. This theme focuses on the provision of private open space and the public domain, creating high amenity areas with a sense of community and identity. The third theme then relates to non-vehicular modes of movement connecting the 800 m nodes in a network of green connectors. The connectors integrate the local urban environment with the mixed-use centers and major transport nodes, connecting Maungarei-o-Tamaki with both local uses and the wider Auckland region. Finally, an overriding synthesis of safety in the urban environment is then discussed in relation to the three themes, including the positive theoretical outcomes of the project.

Five students from the Department of Planning, University of Auckland, namely Ross Holland, David Johns, Ian Munro, Aimee Redknap and Sarah Ricketts, were invited as participants following an old tradition of WSE. The assignment from their teacher was to record the contents of presentations with an Ekistic Grid and present their views as well as participate in the discussion following each session, as part of a more extended educational trip in European cities under the guidance of Dr Thomas W. Fookes.

After the Symposion, all participants received a report by Ross Holland on the Symposion of which we reproduce the cover here.



Right: The front page of the report by Ross Holland.

Below: The students in the lecture hall.

Public affective appraisal for urban design of the CBD of Nairobi

Francis M. Mburu

Mr Mburu, an architect and town planner, is a graduate of the University of Nairobi – with additional studies at the University of Auckland, New Zealand – where his research focused mainly on the "Influence of Physical Setting on Behaviour of Mentally Retarded Children" and "Planning for Pedestrians in the Central Business District (CBD) of Nairobi." He is currently Lecturer, Jomo Kenyatta University of Agriculture and Technology (JKUAT), Nairobi, where he has conducted research on projects such as "Modern Architecture in East Africa," "Urban Continuity and Change – A Case of Pre-industrial Towns on the East Coast of Africa" and "Traditional Architecture in Kenya." The author has also been involved in practice, specifically on the design and supervision of institutional, housing, mixed-use buildings, recreational, cultural and health projects. Mr Mburu is a member of the World Society for Ekistics (WSE). The text that follows was distributed to participants at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

Introduction

There is growing concern about city appearance and how citizens can be allowed to participate in the visual character of their community. This is justifiable, as studies have on one hand confirmed that the design professionals do not share the values of the public and therefore do not deliver these values in plans and design. On the other hand, numerous studies have established that the appearance of a city influences whether a person will approach or avoid the space. These environmental affects subsequently influence behavior and ultimately choice options. The success of any central business district depends on the meaning that the public assign it. The public approach to, or avoidance of, an area depends on the affective quality imbued in it.

This paper introduces and explains "affective quality" and discusses the shopping pedestrians' affective appraisal of different zones of the central business district of Nairobi. It also compares the resulting evaluative image map of the CBD to the mean aggregate revealed preferred routes followed by shopping pedestrians.

Affective quality and information

The information field created by the surfaces enclosing a space governs its affective quality. People can only feel comfortable in environments that emit levels of information that is commensurate with their arousal needs. "Information" represents the psychological meaning of environmental complexity. The level of information capacity that a person can comfortably accommodate has been increasing with the sophistication of the world. People can appreciate higher levels of information than their predecessors who were exposed to less complex environments. This is the reason that built environments that used to be popular in the past are found to be less sophisticated, boring, and unattractive. A Nairobi example is Kirinyaga Road.

Nevertheless, when the collapsed shopping pedestrians' itineraries using the Geographic Information System (G.I.S) program was overlaid on the evaluative map of the CBD, a discrepancy emerged in that the most frequented routes did not fall in the district that possessed the highest affective quality.

The research study that informed this paper established that the public cognize and delimit the CBD of Nairobi in six distinct districts. Amongst these districts, there are those that have desirable affective quality whilst some are abhorred. The areas that are reckoned to possess high affective quality are composed of relatively newer buildings using high-tech construction technology and materials. On the other hand, the undesired districts are predominantly composed of buildings that use locally available construction technology and materials.

This paper proposes the need for regular evaluation of public perception of the city appearance as part of the city planning process. This is in appreciation of the dynamism of culture that calls forth new environments. Subsequently, this process of establishing the affective appraisal of the environment should be integrated in the planning process to be able to model an environment conducive to the psychological well-being of the public.

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Symposion: Defining Success of the City in the 21st Century

Part 8: Synthesis

Chairman : P. Psomopoulos*

Presentations : Ray Bromley, Haruhiko Goto, Rusen Keles, Lawrence D. Mann

Contributions : Jerzy Kozlowski, Ingrid Leman Stefanovic, Vassilis Sgoutas

Discussion* : John Reid, Ross Holland, David Johns, Ian Munro, Aimee Redknap, Sarah Ricketts

*No written record exists of any statement made during the sessions.

To sustainability through interdisciplinary planning: A planner's perspective

Jerzy Kozlowski

Professor Kozlowski obtained his first degrees in Architecture at the University of Krakow, Poland; his Ph.D from Edinburgh University, and Dr hab. from Krakow. He is a professor in Australia and in Poland. His work has focused primarily on research in the field of urban and environmental planning methodology; promoting and sharing his research experience through academic teaching, professional training programs and workshops; and testing and applying the research results in real life. He is a member of the Association of Polish Architects, Society of Polish Town Planners, World Society for Ekistics (WSE) and Fellow of the Royal Australian Planning Institute. The text that follows is a slightly edited and revised version of a paper intended for presentation at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

Foreword

There are many terms describing planning for human settlements. The term "Town and Regional Planning" has been commonly used in the British Commonwealth countries while "Urban Planning" and "Land Use Planning" have been more popular in the USA. Other frequently used terms are: "Physical Planning"; "Town and Country Planning"; "Spatial Planning" and "Settlement Planning" – a favored UN term.

In Queensland, the recent *Integrated Planning Act 1997* applied the term "Environmental Planning," also well known, which was defined by the International Union for Conservation of Nature (IUCN) as: "... a process whereby regional, national or subnational resource conservation or development plans are created in ways that consciously seek to minimise long term negative effects on existing levels of environmental quality ..." There are, however, views which consider Environmental Planning as all types of planning, that is, including planning for regions, towns and settlements of various kinds (see, for instance, FALUDI, 1987, EVANS, 1997, or the actual New South Wales planning legislation). For this paper, originated in Queensland, the use of the term **"planning"** was thought the appropriate choice.

Opening remarks

A dynamic and expanding development of planning throughout the past century cannot be denied. But its critique, often quite strong, must be also recognized with particular attention going to claims that a significant share of planning "output" – that is, of strategic development control, local or regional plans, numerous planning studies and/or more scientifically oriented products in the form of papers, articles and research publications – has been of negligible use in the process of solving everyday and/or long-term problems facing communities and their environment. Such a critique, especially coming from widely differing lobbies, should not be ignored, even if considered outlandish and far-fetched, as there can be no doubt that the prime responsibility of planning is not producing plans and studies of various kinds, or writing books and papers, but rather using them as tools to assist in solving specific social, economic and environmental problems, that exist now or can be anticipated to appear in the future.

Historical development and the present state of planning imply that its main concerns were always the development processes of settlement and settlement systems at all levels, together with their impact on the natural environment, the state of the economy and the quality of human life. Development is a multicomplex process and, in its essence, planning has usually been recognized as responsible for the coordination of development both in space and time.

Planning evolved, generally, from architecture but, later, other disciplines became entangled in it because of their interest in various aspects of development and, at present, the prime responsibility of planning cannot be discharged without close affinity with and knowledge of economic, managerial, ecological, technological and social issues. Such a very large field has compelled planning to evolve as, primarily, a generalist activity that must examine development from a wide range of viewpoints coming from many disciplines, and then try to integrate this very broad spectrum into planning decisions.

At the same time, both science as a whole and many professions started to become more and more specialized and polarized with several disciplines showing a tendency for splitting and, thereby, further narrowing their sphere of concern. New disciplines emerged and expanded into new fields that led to the growth of a "jungle" of terminology and axioms superimposed upon an array of disciplines, previously homogeneous and well established. Nevertheless this tendency, which derived from an urge to go deeper and deeper into the unknown, has been logical and proper in most cases. However, it should not be overlooked that the greater became the number of new, highly specialized disciplines, the greater the need for generalization and integration. A tendency to specialize could have been noted in planning as well, since its very character called for planning problems to be, as a rule, considered in a wider setting. In planning, therefore, there was always a continually developing need, not only to prevent the narrowing tendencies, but rather to promote those tendencies associated with generalization. As a consequence, it can be put forward that the narrow, specialized avenues in planning be left in the hands of scientists and/or professionals from other, affiliated

disciplines while planners concentrate on:

- formulating questions directed to those disciplines to indicate specific problems that require an interdisciplinary examination, but in the context of planning tasks; and,
- widening their knowledge of development processes and their implications, but based on the results of and the perspective from other disciplines.

This implies that an ability to formulate the right questions is critical for both sides and it seems to be often more important than finding the right answers, as once the right question is posed, sooner or later, someone will come up with the right answer, while a right answer to a wrong question simply does not exist. Similarly important is the ability to listen to questions asked by others and, as a consequence, to make necessary adjustments. Therefore, formulation of questions seems to be one of the prime requirements and skills of contemporary planning and essential for its evolution.

Achieving a comprehensive knowledge of development processes appears, in turn, unattainable by individual planners, and one of their basic skills must become a capacity to synthesize and integrate the results of research, retrieved primarily from other disciplines, into a coherent whole.

All that leads to another logical conclusion, which is that learning about the methods and findings of other disciplines becomes a prerequisite of almost any responsible planning research and practice. This may be best accomplished by interdisciplinary cooperation and understanding between various specialists or various scientific and/or professional disciplines (KOZLOWSKI, 1988).

The real life context

Environmental crisis and its roots

There are two main and global groups of problems faced by most countries today:

- widespread and increasing poverty, usually interrelated with high unemployment, rising crime, or poor public health; and,
- a continuing degradation of the natural environment threatening the very survival of humankind.

A solution to problems in the first group is, in particular, to speed up economic development through strengthening economic growth, restructuring economies, restoring balance of payments and increasing Gross National Product (GNP), while a solution to problems in the second group depends primarily on reversing processes that cause deterioration of natural resources, degradation of land, loss of species, negative climatic changes and pollution in all forms.

As a consequence, a major conflict unfolds because economic development and associated growth, considered as leading instruments in the fight against poverty and for an improved quality of life, rely heavily on the exploitation of natural resources, such as air, water, soils, plants and animal species, all of which have been sustaining life for millions of years and which are under threat of becoming irreversibly damaged or totally destroyed.

Thus questions arise: What is development and how should it be defined? Is the increase of real income its main objective and measure of success? Can its adverse environmental effects be avoided or, at least, minimized?

Development was defined by the International Union of Conservation of Nature (IUCN, 1980) as "...financial, living and non-living resources to satisfy human needs and to improve the quality of human life..." The definition is still valid and development must, therefore, be seen as an intrinsic feature of our civilization and the cornerstone of progress, expressed primarily by welfare improvement in the community. The price of this progress, however, is becoming higher and higher. Development does not necessarily indicate growth but should rather be understood as "... the realisation of specific social and economic goals which may call for a stabilisation, increase, reduction, change of quality or even removal of existing uses, buildings or other elements, while simultaneously (but not inevitably) calling for creation of new uses, buildings or elements ..." (KOZLOWSKI and HILL, 1993). Definitely, it should never be seen as only a synonym of growth.

Development is realized through *changes* in the existing natural environment and these changes both involve costs and bring benefits. Costs are not only economic but also social and ecological. The latter often have damaging effects on this environment. The environment and the economy *necessarily interact* as economic systems impact on the environment by using up resources, by emitting waste products to receiving environmental media or by affecting the functioning of the environment as the global life-support system on which we all depend. As a consequence, a continually worsening, major environmental crisis has been developing over the past decades and the main natural resources, which have been sustaining life for millions of years, are now under threat.

To reverse these catastrophic trends environmental concerns must be integrated into economic policy from its highest (macro) level to its most detailed (micro) level. There is, therefore, an urgent need for a shift in the way economic progress is pursued and in the way development planning is carried out.

It is wrong to assume that this can be achieved by the free market alone because it has been, primarily, designed to address the short-term issue of the optimum allocation of scarce resources and because it will never tell when the development must stop for ecological reasons or how much enough is enough. The economic process must also not be seen – as is often the case – as a closed loop between production and consumption in which nothing is used up. In reality there is a flow of matter and energy from resources to pollution but resources are priced at the cost of extracting them and not for their replacement – a clear "theft" from the future.

Compensation for the future must, therefore, be focused not only on man-made "capital wealth," but also on "environmental wealth." However, at present, many of the natural resources – and services they provide – are treated as so-called "free goods" because no market place exists in which their true values can be revealed through acts of buying and selling. In addition, economic growth has been measured by such misleading indicators as the GNP, which is constructed in a way that tends to divorce it from indicating the real standard of living and quality of life of the population. For instance, if pollution damages health, and health care expenditures rise, the GNP goes up implying, quite wrongly, a rise in the "standard of living," not a decrease as is really the case (PEARCE et al., 1989). All that has been known and documented for years. Over a decade ago main world organizations indicated an urgent need to introduce new, true measures of economic well-being including "... increases in natural assets minus depreciation of natural assets minus defensive expenditures against environmental damage minus the costs of unmitigated environmental damage..." (IUCN, UNEP and WWF, 1991).

The way to recovery: "sustainable development"

The environmental crisis is certainly *global:* human civilization is about to destroy itself by destroying the natural resources on which its existence is based. Hence, not only scientists but also politicians across the world have begun to take note of this new ecological challenge and have taken preliminary steps towards devising a potential strategy to control the threats involved.

A fundamental question is whether development can continue to achieve its ends while, at the same time, its negative impacts are reduced to the level at which they will no longer be a major threat to human survival. This question was first confronted by the World Conservation Strategy (WCS) in 1980, where a fresh approach to the problem was launched on the ground that "... development and conservation are equally necessary for our survival and for the discharge of our responsibilities as trustees of natural resources for the generations to come ..." (IUCN, 1980). This statement led to the idea of "sustainable development" and the idea of the integration of development with conservation.

The WCS defined conservation as "... the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the physical and intellectual needs of future generations ..." The strategy indicated that "... for development to be sustainable it must take account of social and ecological factors, as well as economic ones; of the living and non-living base; and of the long term as well as the short term advantages and disadvantages ..." and set three fundamental goals for ecological sustainability:

- the maintenance of essential ecological processes and life support ecosystems;
- the conservation of biodiversity; and,
- the sustainable utilization of species and ecosystems.

The main and commonly recognized goal of sustainable development, formulated and widely promoted by the so-called Brundtland Report, is primarily to achieve a reasonable and equitably distributed level of economic well-being that can be perpetuated through "... development that meets the needs of the present without compromising the ability of future generations to meet their own needs ..." (WCED, 1987). Clearly, if that goal is to be achieved, sustainable development must be based on *both* conservation and development and must integrate "ecological" sustainability with "economic" sustainability. The goal had deep impact on the understanding (and also misunderstanding) of the sustainability concept. Yet, it was also a subject of strong criticism as it was seen as advocating too much economic growth as necessary to achieve sustainable development, but without any attempts to redirect this growth. It failed, for instance, to indicate the importance of recognizing the urgent need for a new approach to "environmental accounting" by requesting that a proper "pricing" of the use of such free goods as water or air be urgently introduced.

Further milestones on the "road to recovery" were, among others, such international agreements and conventions as the 1987 Montreal Protocol to reduce CFCs, the 1988 First World Conference on "The Changing Atmosphere" and the 1992 UN Earth Summit in Rio directing its focus to treaties on biodiversity, climate change and the so-called Agenda 21 addressing the problems of the 21st century. Primarily, however, though with many controversies, the summit "... marked the beginning of a continuing dialogue between the rich and the poor nations over the management of the Earth..." (PICKERING and OWEN, 1994).

Among many definitions of sustainable development the one proposed by the Strategy for Sustainable Living – a follow-up to the World Conservation Strategy – is particularly relevant for physical planning as it considers that the main aim of sustainable development is "... improving the quality of human life while living within the carrying capacity of supporting ecosystems ..." (IUCN, UNEP and WWF, 1991). The concept of "carrying capacity" is directly linked with that of the *final limits* of the Earth's ecosystems to the impacts they can withstand without irreversible damage while the expected services of supporting ecosystems clearly depend on *conservation of biodiversity.*

Traditional free market economists do not recognize any "limits" to economic development and believe it can go exponentially forever. However, advocates of sustainability (DALY and COBB, 1989; PEARCE, 1989; BARROW, 1993) agree that there are final, or critical limits (constraints, thresholds) to what the natural environment can take or provide, that they determine the carrying capacity which cannot be continually violated without a threat to our survival, and that science and technology can never provide effective means of permitting the extension of these limits indefinitely.

Conservation of biodiversity is, in turn, essential for a continuous supply of:

- *renewable resources* such as fish stocks, forests, domesticated and wild animals, which provide the basis for food and cash crops supporting a wide range of human activities, or soil ecosystems which are particularly essential for crops and forests;
- *environmental services* which are of paramount importance for human prosperity; for instance, a forest provides not only wood but also the services of water storage and flood management while other biological systems break down pollutants and recycle nutrients thus absorbing the waste products of economic activities; and,
- *life-support ecosystems* such as those providing one of nature's most critical continuing exchange of carbon dioxide and oxygen among plants and animals.

Renewable resources are essential for human prosperity, but without environmental services and life-support ecosystems, which cannot be replaced, life on earth would not be able to continue in its present form if at all (MUNASHINGHE, 1994; HAWKEN et al., 1999). An overall conclusion is that achieving sustainable development means to ensure that both its ecological and economic sustainability be achieved at the same time.

The future promise: "natural capitalism"

An important milestone on the road towards sustainable development can be linked with the recent development of a new and revolutionary concept called "natural capitalism" (HAWKEN et al., 1999). Its proponents convincingly argue that the changes needed to achieve ecological and economic sustainability could come about within the next decades as the result of economic and technological changes already in place. However, for this to happen it is necessary for the existing industrial systems, which have reached pinnacles of success in commanding human-made capital, to recognize that it takes place at the cost of rapid decline of natural capital on which economic prosperity largely depends. Clearly, limits to this prosperity would increasingly be determined by natural capital rather than industrial proficiency.

Natural capitalism goes beyond the traditional definition of capital as "accumulated wealth in the form of investments, factories, and equipment," by stating that the economy needs the following four types of capital to function properly (HAWKEN et al., 1999):

"– human capital, in the form of labor and intelligence, culture, and organization;
– financial capital, consisting of cash, investments, and monetary instruments;
– manufactured capital, including infrastructure, machines, tools and factories;
– natural capital, made up of resources, living systems, and ecosystem services ..."

Yet, all environmental reporting and scientific research confirm that "... the decline in every living system in the world is reaching such a level that an increasing number of them are starting

to lose ... their assured ability to sustain the continuity of the life processes. We have reached an extraordinary threshold ..." (HAWKEN et al., 1999).

Recognition of this reality led to the rise of natural capitalism, which is expected to supersede the conventional, industrial capitalism, which violates its own fundamental principles when it liquidates its prime capital (natural) and calls it *income*. This happens because conventional capitalism accepts that the natural capital, that is, natural resources and their services, are so-called "free goods." As a consequence, no value has been assigned to the largest, natural stock of capital employed in development processes.

The proponents of natural capitalism ask, therefore, such questions as: "... What would our economy look like if it fully valued all forms of capital, including human and natural capital? What if our economy were organized ... around the biological realities of nature? What if Generally Accepted Accounting Practice booked natural and human capital not as a free amenity in putative inexhaustible supply but as a finite ... actor of production? What if ... companies started to act as if such principles were in force?..." And they answer that "... this choice is possible and such an economy would offer a stunning new set of opportunities for all of society, amounting to no less than the next industrial revolution ..." (HAWKEN et al., 1999).

The movement towards natural capitalism had been simmering for quite a while to burst out through the "1997 Carnoules Statement" directed to governments and business leaders by the international Factor 10 Club (founded in 1994 in Carnoules) which, among other things, called for a leap in resource productivity to reverse the growing environmental damage and claimed, in its opening "prophesy," that: "... Within one generation, nations can achieve a ten-fold increase in the efficiency with which they use energy, natural resources and other materials ..." (FACTOR 10 CLUB, 1997).

To increase resource productivity meant achieving the same amount of utility or work from a product or process while using less material and energy. Adhering to the spirit of the Statement, Hawken et al. (1999) introduced four strategies for the implementation of natural capitalism, based on a fundamental principle that countries, companies and communities operate as if all forms of capital were valued. It is affirmed that the strategies "... can reduce environmental harm, create economic growth, and increase meaningful employment ..."

The strategies are:

- *Radical Resource Productivity*, which is the cornerstone of natural capitalism because using resources more effectively

– slows resource depletion at one end of the value chain,
– lowers pollution at the other end, and
– provides a basis to increase worldwide employment.

- *Biomimicry*, which eliminates the very idea of waste by redesigning industrial systems on biological lines enabling the constant re-use of materials in continuous closed cycles, and often elimination of toxicity.
- *Service and Flow Economy*, which means a shift from an economy of goods and purchases to one of "service" and "flow" wherein consumers obtain services by leasing or renting goods rather than buying them outright. Then the product is a means not an end and remains an asset leading to minimization of material use and maximization of its durability (clear incentive for improving resource productivity).
- *Investing in Natural Capital*, which works towards reversing environmental decay by reinvesting in sustaining, restoring and expanding stocks of natural capital, so that abundant ecosystem services and natural resources can be produced.

Hawken et al. (1999) present an impressive array of opportunities and possibilities that are real, practical, measured, and documented, followed by overviews of remarkable technologies that are already in practice. They all convincingly indicate that once a non-sustainable aberration of conventional, industrial capitalism – based on the premise of no value being assigned to natural capital – is abandoned, there would be no true separation between how we support life economically and ecologically. And this is the main principle of sustainable development. Thus natural capitalism can definitely be seen as the means by which sustainable development not only can, but most likely will be achieved in real life.

Natural capitalism is particularly relevant to urban development, not only regarding natural resources but also human resources and social services, as the present form of industrial capitalism equally ignores the "...valuable but unmonetised 'social system services' – culture, wisdom, honour, love, and a whole range of values, attributes, and behaviours that define our humanity and make our lives worth living ..." (HAWKEN et al., 1999), which are produced by human resources. As a consequence, industrial capitalism is destructive both to natural and human resources and the four strategies of natural capitalism can pave, thereby, the way to reverse the present anomalies in relation to human capital as well. A most telling example (HAWKEN et al., 1999) on how it has been done differently and with what spectacular results comes from Curitiba, Brazil, and reinforces the feeling that there is an urgent need for opening an interdisciplinary discussion on whether and how to integrate into everyday planning the ideas and main strategies of natural capitalism.

The state and role of planning

Is there any, commonly recognized, "mission" of planning in a world which is becoming increasingly complicated and overcrowded? The answer is very much related to a number of well known questions, such as:

- How many people can the earth hold?
- Will birth and death rates continue to decline?
- Can food production keep pace with population growth?
- Can technology supplement or replace today's resources?
- What are the long-term effects of pollution on health, climate, and farm production?

A glimpse into the history

Debate over such issues has filled volumes, as scholars have been looking to the future with varying degrees of optimism or pessimism. Although there have been many controversies around numerous matters, there has hardly been disagreement on four of them:

- the speed of change will accelerate;
- our survival is at stake;
- the world will be increasingly complex; and,
- nations and world issues will be growing more and more interdependent.

The problem of solving pressure on land and natural resources caused by accelerating development, while retaining a relatively conflict-free co-existence between people, is as old as our civilization. Thousands of years ago it became clear that to properly organize space and to allocate land uses while ensuring appropriate protection of the natural environment was, in fact, a necessity of everyday life and determined its quality – comfort and convenience, in particular. To deal with these types of problems is the primary "mission" and challenge for what, over the past hundred years, has become known as "town planning." However, planning was carried out, in fact, for much longer but people were not aware that by being in-

volved in simple, practical activities, they had, in fact, become planners. Yet how, if not as a type of planning, can a process be described, whereby primeval farmers had to define the areas to be reclaimed from the forest and later subdivided into sub-areas for crop rotation, or when it was necessary to determine the optimum location for building a house, maximizing its functional value and minimizing its potential negative impacts on the surroundings?

One may see the birth of planning in ancient Greece, but it came to be seen as an economic and social necessity after being recognized as a promising tool to put some order into the dynamic and chaotic urban sprawl characteristic of the "industrial revolution" in the second half of the 19th century. Many would consider a Scottish naturalist and sociologist, Patrick Geddes (1854-1932), as the "father" of contemporary town planning, while others would point to Arturo Soria y Mata (1844-1920), Ebenezer Howard (1850-1928), or Tony Garnier (1869-1948). Planning was established formally in 1909 when the first Town Planning Act was passed in England. Some years later one of the milestones in its evolution was a debate setting objectives of urban development at the fourth CIAM (International Congresses of Modern Architecture) in 1933. They were published as *The Athens Charter* by Le Corbusier (one of CIAM's founders) in 1943 to become, for a long time, the basic textbook of modern planning – introducing, among others, "home-work-recreation" as fundamental components of contemporary cities. Its extensive, further development, following the Second World War, led to further consolidation of planning in a form known later as "traditional planning," prescriptive in character and based on zoning and a master plan as its end products.

Although the nature and substantive focus of planning was continually discussed, for quite a while its main forms were not modified. This state of the art had, finally, to face a major challenge in the late 1950s when traditional planning started to be seriously questioned. It was the time when the world was surviving a post-war economic boom, giving rise to new disciplines, new technologies and new social "cultures." In this context planning was seen as lagging behind with its inflexible, static and, primarily, mono-disciplinary approach, detached from many real-life problems and, what was more important, from the decision-making and implementation processes.

As a consequence, several new forms of planning began to appear in the 1960s and 1970s. Some gained substantial support and had a permanent impact on the discipline of planning. Others vanished like meteors. Among those worth noting were:

- "tactical planning," goal-oriented and believing in persuasion not enforcement (GUTTENBERG, 1964);
- "advocacy planning," considering a plan as a tool to steer progress towards goals and insisting that planners be involved in implementation through negotiations, dialogue and advocacy (DAVIDOFF and RAINER, 1962; BLAIR, 1971);
- "structure planning," promoting plans of strategic character, requiring alternatives and introducing mandatory public participation (PLANNING ADVISORY GROUP, 1965; McLOUGHLIN, 1966);
- "adaptive planning," rejecting forecasting and end product while believing only in short-term planning proceeding through interactions with developers in free market conditions (FOLEY, 1964);
- "action planning," advocating integration of planning, decision making, public involvement and implementation to take place in the center of action (FRIEDMAN, 1971); and,
- "systemic planning," replacing forecasting by planning through computer simulation and modelling used to steer the development process (McLOUGHLIN, 1969; CATANESE and STEISS, 1971; CHADWICK, 1971).

These two decades marked a significant evolution in planning. Attention of planners was drawn, for instance, to the importance of goal formulation, development alternatives, public participation, integration of planning with implementation and, through promoting a system approach, to the need to see cities and multicomplex organisms. At the same period, the Greek planner and philosopher Doxiadis (1968) originated "ekistics" as a science of human settlements, thereby, recognizing planning as part of science.

The professional and academic debates in the decades of the 1980s and 1990s were not so prolific in the generation of new forms but concentrated more on the very purpose of planning. One of the main questions was whether planning should preserve the status quo or rather seek to change it and how far it should adapt to different political and economic systems. Different answers were often translated into planning legislation which then determined the ways planning was practically applied in various countries.

Planning, from the 1950s, was also closely associated with so-called "urban design" which was often, and incorrectly, seen as akin to site planning and landscape design that included built elements or, at best, as a marginal discipline, applicable at individual site levels and sitting between architecture and planning. Such views have been challenged for quite a while and, recently, comprehensively repelled by Frey (1999) who considers it as a potential, major tool for guiding development towards more sustainable urban form and structure, at regional, city and local levels.

The present "state of the art"

A simple but astute synthesis of the present "state of the art" of planning evolution was recently provided by England (2001). She convincingly argued that in the recent period planning has consolidated into the three main types:

- "minimalist,"
- "instrumental," and
- "incremental."

How efficient and positive are they, regarding the overall well-being of human communities and their environment?

- **Minimalist planning:** Its main aim is to keep development of land in order while minimizing negative environmental impacts and economic loss. Its only "vision" is to prevent chaos and, therefore, minimalist planning is concerned "... more with development control on a case-by-case basis than with formulating policies and strategies to guide development ..." (ENGLAND, 2001) and, as a consequence, its main instruments became zoning and development control plans. This type of planning greatly facilitates urban development and has been well supported by the development community whenever it was applied. In Queensland, for instance, till 1997 when the *Integrated Planning Act 1997* was introduced, the main objective of the *Local Government Planning and Environment Act 1990* was to undertake the planning of an area to facilitate orderly development and the protection of the environment. Minimalist planning is very pragmatic and concentrates on what is real and obtainable and not on often esoteric and endlessly debated goals. As such it definitely upholds the status quo. This is not necessarily wrong, but it may be a hindrance to any reforms that try to improve it.

- **Instrumental planning:** This type aims first at the identification of socio-economic goals and then at making sure that they are effectively implemented. It has developed in two primary forms:

- The first concentrates mainly on improving and protecting

the physical environment as one of the major warrants for improving the quality of human life. Evans (1997) has even recognized it as "classical town planning," which would normally venture beyond that purely physical agenda to take interest in goals and aspirations of society in general.

• The second form shifts to the social problems and society's goals seeking from planning its active assistance in their achievement. This moves planning away from its traditionally affiliated disciplines of architecture and engineering towards a whole array of social sciences.

While accepting that differences between these two forms may vary, Friedman (1996) is convinced that it is the degree of social orientation that determines what is good planning. England (2001) points to the critique of instrumental planning coming, primarily, from political economy and post-modernism circles.

• The first argued that this form of planning is incapable of achieving its ambitious aims because that is totally dependent on and constrained by the dynamic mechanism of capitalist economies. This could imply that it is "... the urban social movements and not planning institutions which are the sources of change and innovation within the city ..." (KIRK, 1980).

• The second stood on the ground that neither human behavior, nor far too complex links between urban form and societal well-being can ever be effectively "managed" and, in addition, denied the possibility of establishing any clear consensus on goals. The critique has made good points but has not only been exaggerated. What is more important, it has not offered any positive and realistic alternatives to planning. Refuting part of it England (2001) makes two convincing arguments, that "... although instrumental planning cannot alter society's fundamental structural problems it may, nevertheless, have a role to play in implementing more modest reform goals, in the short term or in specific situations. The preservation of a particular habitat ... may be an achievable goal of planning even if the sustainable management of whole species is beyond the grasp ..." and that "... the absence of any vision is an invitation to preserve the status quo, however unsatisfactory that may be. Planning may actively obstruct reform if it fails to move with the times and reflect the dominant goals and aspiration of society ..." In conclusion she argues that instrumental planning if sufficiently well integrated with all essential economic and social aspects of society may become quite effective and that it will naturally develop into holistic, integrated and multi-facet planning.

• **Incremental planning:** This type of planning, which can be seen as a kind of response to the critique of instrumental planning, is supposed to be very pragmatic and "down to earth." The main responsibility of planners is not to discuss how to change the world but to use their qualifications and experience in the proper application of planning law. As a consequence "... the claim to expertise here is based upon a knowledge of the policy process in managerial and political terms and of procedures and case law, linked to a knowledge of the economic processes by which urban development is generated and shaped and a capacity to mediate ..." (EVANS and RYDIN, 1997). Incremental planning is based on a recognition of existing, competing interests and the need for mediation. This locates it not too far away from minimalist planning as both are not interested in any major changes in the existing status quo and believe that planning goals only be set incrementally and within a specific, not general context. Planning as social learning is advocated (FRIEDMAN, 1996) and planners are expected to learn from practical experience what good planning is. As a consequence, this form started to focus on community participation. Recapitulating, England (2001) notes that: "... Participatory incrementalism suggests state planning can adequately incorporate the views and goals of urban social movements if the right type of participatory mechanisms are established ... Accordingly, planners are facilitators trained in mediation and procedural processes rather than strategists attempting to operationalise any particular planning goal. Nevertheless, participatory planning does not deny the feasibility of establishing context specific goals ..."

As previously happened in the 1960s and 1970s, with a larger number of emerging new forms of planning, these three types are in many ways interconnected and, if presented as circles, they will be partly overlapping and also locked together within a larger, all-encompassing circle indicating the main and rather widely recognized, social responsibility of planning. Depending on particular problems to be solved, external circumstances and the kind of actors participating, the responsibility could then be discharged in various ways. But is it possible to define such an overall responsibility? Are there universal problems which all types of planning must face, or actors which, almost as a rule, must be involved?

In general, a problem is encountered when a specific aim cannot be achieved. A formula:

"Problem = Aim + difficulties in achieving it"

was proposed a long time ago by Chadwick (1971) and, accordingly, it is not possible to define any problem without first knowing, at least in broad terms, what the aim is that, due to encountered difficulties, cannot be achieved and is, thereby, generating that problem. According to Mazur (1976), at this stage it is necessary to know whether:

- the surrounding world, or the reality (within which the aim is to be pursued) is to be left in peace and all efforts will be directed into its observation and examination to gain all knowledge about it, necessary to handle the problem and achieve the aim; or,
- the reality is to be transformed, and to deal with the problem it is necessary to determine why, how and from what the aim is to be achieved.

As can be seen, the attitude becomes a determining factor here as it is, either reflecting "non-intervention" and then "cognitive problems" are to be addressed, or "intervention" when "decision problems" are to be dealt with. This basic classification of all problems is logically complete and there cannot be any other than cognitive or decision problems. Both are often strongly interrelated and, usually, problems in the first group precede those in the second – or become part of them.

In both cases, however, to define that a problem exists, the aim must be known. This is a common sense that applies also to planning. Thus, problems that planning must deal with would primarily reflect difficulties that prevent the achievement of main planning aims. And what are the latter? Logically, they should be derivative of the aims of human settlements.

A "vintage" definition of the "aims of human settlements" formulated by the United Nations Environment Programme (UNEP) nearly 30 years ago still sounds convincing. It says that human settlements are "... to meet human needs and aspirations by providing the conditions suitable for the biological, social, economic, cultural and intellectual evolution of the human communities involved. This evolution should be in concordance with the environmental and socio-economic potential ..." (UNEP, 1977). And, as a consequence, planning aims should in general:

- secure the "survival" of a given settlement by defining how its environment is to be protected – the very essence of sustainable development; and,
- find such an urban form (pattern, strategy) that a possibly optimum basis be created for the "functioning" of a given settle-

ment and for its biological, social, economic and intellectual "development."

The proposed subdivision of planning aims, if accepted, may assist in overcoming one of the main shortcomings in a conventional way of subdividing planning goals along ways government systems are organized, that is, into education, housing, primary industries, transportation, environment, health and so on. This is expedient in practice but may lead to goals, that derive from the aims, being so compartmentalized that their often obvious mutual interdependence is either lost or, at best, underestimated.

Minimalist, instrumental and incremental types of planning embrace, usually, all these main aims though the focus of attention around them would differ. This is not necessarily bad as it would help to ensure general, political support for overall planning with temporarily varying preferences to some of its main types. It also may be argued that any type of planning would be ready to recognize that the main problems it will have to address would reflect difficulties, existing or anticipated, in achieving survival, functioning and development aims.

What are now the main actors, stakeholders or – as England (2001) wants – "clients" of planning? She puts them into traditional public and private client while also introducing an interesting third type, which is the neighborhood. According to her, "... The public client is of course the community ... to be affected by development ... There are however many communities and many conflicting interpretations of their interests. There is also the wider "public interest" that, with increasing concern for ecological sustainability, may arguably extend to the concerns of international community ... private clients include applicants (individual and corporate) seeking to develop their own or someone else's land. Professionals, including development consultants and lawyers operating associated commercial services may also be regarded as private clients ... [and, finally] ... the neighbourhood, that is, people living in the vicinity of a proposed development who perceive their personal interests will be affected by development if it goes ahead ..."

The latter is indeed a hybrid category for when the concerns of people relate foremost to potential impacts on their property and/or well-being they represent private interests, but when they act to ensure that the community will not suffer they become guardians of public interests.

Field of interest and the nature of planning

The need for planning is not as well understood and recognized as the need for such disciplines as law, medicine, economics and so on. It seems important, therefore, that at least those involved in planning understand clearly its role. Why do we need to plan? What is the role of planning in the community? What might happen without planning? Such questions have been discussed for many decades with mixed results as, clearly, planning can be seen in different ways by different people. Some may even argue that life would be easier without it as planners only obstruct development and it all largely depends on who is the "judge" – a citizen, a developer, a politician – and from what viewpoint planning is assessed.

But what is planning, finally? Science or profession? Is it not, perhaps, both at the same time?

There was heavy "shelling" around this question for over a century when new areas, situated somewhere in between other well established disciplines, both scientific and/or professional, have developed and often proved to be particularly promising. A long time ago Wiener (1948), a "father of cybernetics," argued that some neglected areas, left in no man's land, were the most prone to evolving new ideas. It may be argued that planning falls into this category and has developed as a discipline in its own right which, with its rather unique coordinating and integrating abilities, can bring new approaches and span quite a few traditional disciplines.

But is it generally right to separate science from professions? This old dilemma was skilfully tackled, decades ago, by Batty (1979) in his excellent analysis of the planning process which, he argued, encompassed two major and interrelated processes:

- one, related to the gathering of knowledge about a subject of planning; and,
- another, which was to use this knowledge for generating actions.

Traditionally the first may be considered as calling for "scientific research" with cognitive orientation, while the second as the responsibility of "professional approach" with decision-making orientation.

One of the main conclusions drawn by Batty (1979) was that "... the distinction between science and design is much less clear than it might appear ..." and, more importantly, that "... it is probably impossible to do science without design or design without science ..." Consequently it means that scientific and professional aspects of planning are virtually inseparable. Thus, it should be recognized that any planning exercise does not only include the definition of problems, which calls for cognitive research, but almost invariably must seek their optimum solution, which involves postulation, optimization and realization, as typical decision-making problems.

This reasoning can be applied to many professional disciplines and it is worth pointing out that following the same line of thinking, Mazur (1976) made his principal philosophical, all-embracing statement that "... science as an activity concerned with problem solving is one whole ..." According to him it was a tragic misunderstanding that for thousands of years only cognitive problems were considered as being part of science while decision problems were left in the hands of politicians and/or so-called professionals, often including people who did not have the slightest idea about a rational approach to solving these problems. One may add that even today a great number of decision makers do not know that any decision, as the solution of a decision problem, should be founded on a rational, scientifically sound base and that its correctness must be proven. The relevance of this statement not only to the realm of planning but also with regard to all disciplines recognized commonly as "professional" and, by false inference, not scientific, seems to be quite conspicuous.

Planning and sustainable development

The concept of sustainable development and its worldwide impact has impinged upon various disciplines, both in academic and professional circles.

Scientific and professional responsibilities

How has this concept of sustainable development influenced the evolution of planning theory and its main responsibility, that is, the preparation of planning schemes? Has the theory and practice satisfactorily encompassed the concept of sustainability and has its achievement been sufficiently recognized as an inherent and important part of a planner's responsibility?

Although in the 1990s marked progress can be noted in this field, a predominant, day-to-day approach to environmental problems by many planners is still much more "ex post" rather than "ex ante," i.e. curing the symptoms rather than preventing the causes. The emphasis has been on where, what and how much to develop, rather than what ecological or environmental consequences such development will entail. In addition, plan-

ners also have been failing to seriously consider the significance of keeping development within the carrying capacity of natural ecosystems and to ensure the continuing maintenance of natural resources and life-support ecosystems that provide essential environmental services. Yet, it is planning that can and should play a key role in maintaining water flow patterns, protecting soil, preventing bio-degradation of pollutants, recycling wastes, regulating climate, supporting fisheries and other important living resources. In spite of worldwide efforts promoting ecologically sustainable development, the interrelationships between the needs of humans and the needs of nature have still often been ignored within the main strands of development decision making. It seems that the "green" way of thinking may have yet to penetrate planning at large and its "statutory" facet, in particular. The absence of an easily identifiable "common," basic approach for planning towards sustainable development is also worrying, particularly at the everyday planning level where the majority of development decisions are made. Therefore, an ongoing need "... to adopt and implement an ecological approach to human settlement planning to ensure explicit embodiment of environmental concerns in the planning process and thus promote sustainability ..." (IUCN, UNEP and WWF, 1991) is as necessary now as when it was defined.

For a long time it has been widely recognized that the main role of planning is *to guide, to control and to coordinate development in space and time*. Most of the planning types developed over years would probably agree with this. However, the concept of sustainable development has surged into the world scene with considerable impact and several questions have emerged:

- How critical and urgent is it for planners to join the mainstream of the unfolding battle for the survival of our planet?
- How can planning most efficiently contribute towards implementation of sustainable development?
- Should environmental concerns become an integral and mandatory component of the planning process?
- Should not, therefore, the role of planning be re-defined?

Answering the latter it can be argued that development is commonly governed by three groups of factors:

- **socio-economic goals,** reflecting physical and intellectual needs of a given community;
- **geographic environment,** creating constraints and opportunities; and,
- **socio-economic determinants,** including the state of the economy, technology, social organization, cultural tradition, political system, etc.

In turn, a generic definition of any "planning" may see it as the process of defining goals and of indicating by which ways and means these goals can be attained. The goals should be defined by the community or, at least, with its strong involvement, as socio-economic determinants are, generally, beyond the direct control of planning. This means that, within the overall context discussed so far, the role of planning could be redefined and seen as to indicate how, within a given geographical environment and socio-economic determinants, development can most efficiently be guided, controlled and coordinated to achieve the pre-determined goals and, at the same time, ecological and economic sustainability.

Recognizing that statement would mean accepting sustainable development as an integral part of gazetted planning's goals. This has been already happening. For instance, in Australia the new *Integrated Planning Act,* passed in Queensland on 1 December 1997, has put in its first paragraph that "... The purpose of this Act is to seek to achieve ecological sustainability ..." The "planning world" in Queensland, and notably planning legislation as well, have never been the same again. This is certainly not the only place in the world where planners have been moving in this direction though, regrettably, there are more places where they have not.

In this context, planners involved in generating and/or advancing various development proposals – policies, strategies or projects – and in determining their environmental and economic consequences have a responsibility to integrate the principles of sustainability, developed at global, national and local levels, into decision-making processes to ensure that the outcomes of development are sustainable and that biodiversity is conserved. To discharge this responsibility they should, primarily, concentrate upon:

- **Management of development,** with particular attention to the rational use of land and all resources, to be carried out primarily through properly establishing the preferred:
  - *location, scale, kind* and *timing* of development, to be contained within the ecologically and economically sound "solution space" defined by physical constraints of final character; and taking into account all remaining constraints and opportunities imposed by the geographical environment; and,
  - *form (patterns)* of development, designed to facilitate attainment of ecological and economic sustainability for the identified range of reliable development options.
- **Conservation of nature,** with particular attention to biodiversity, to be achieved primarily by
  - *preservation and protection* of the natural environment and its resources; and,
  - *rehabilitation and restoration* of elements destroyed in the past.

Thus, planning must be accountable for providing a reliable base for day-to-day development decision making related to various aspects of the functioning and development of settlements and the conservation of nature and natural resources.

The real "value" of planning would depend, however, on *efficiency* of implementation, that is on how successfully it intervenes in an ongoing process of development and decision making. In this regard the prime responsibility of planners in the field seems to be at least:

- to examine all possible development proposals (alternatives, strategies) leading to the attainment of socio-economic goals;
- to indicate environmental and economic consequences of pursuing these proposals;
- to ensure that each proposal submitted for consideration is *"implementable";* and,
- to recognize that decision makers (politicians and developers), a range of various stakeholders and the community at large, are fully informed of the scope, magnitude and character of these consequences.

A "model" planning process

Safeguarding the efficiency of planning, which determines its real value, depends primarily on three groups of factors:

- **interrelations** between planners and decision makers, stakeholders and the community;
- management of development processes and the use of various **incentives** or **sanctions** to influence the behavior of the main players in these processes; and
- **planning methodology** reflected, to a great extent, by the planning process.

The latter group is primarily planning's domain, and should be given particular attention, while promoting interdisciplinary discussion and/or co-operation in planning for sustainable development, to make it easier for specialists from other disciplines

to understand the main principles and the way of thinking behind planners' approaches to the preparation of local and strategic plans. They may then raise some important questions on the matter and take an active part in answering them:

- Is it, however, possible to characterize those approaches in general?
- Are there any universal and basic components of a planning process?
- Is there any common interdependence between them?
- Is there any, normally recognized, sequence in which they should be dealt with?
- Are there, finally, any external, though affiliated, components that, as a rule, must be taken into account?

A simplified, "model" planning process presented and briefly examined below is expected to help answer such questions. Certainly, it offers only a basic structure of the planning process, as a mental framework for a rational approach to problem solving in the course of a planning exercise. Thus, it can be seen as a *flexible guide* for the preparation of any major type of local or strategic plans but also as a *platform* for discussion on how it can be improved. If applied in practice, it certainly would have to be expanded and adapted to concrete circumstances (specific problems, legal setting, local administration and so on).

To be consistent with the aim of this paper, the "model" process should, in particular:

- expose where in the process planning can make its main contribution towards attainment of sustainable development; and,
- indicate the importance, mutual interdependence and place in the process of its major internal components and external determinants.

The process (fig. 1) is based on Mazur's *postulation, optimization* and *realization,* as three main stages required for solving decision problems (KOZLOWSKI, 1988) and subdivides it into corresponding main phases. Within their components specific matters are to be addressed and questions answered to attain expected outcomes. This concept is further elaborated in the matrix below (table 1).

● An important part of the process is **Evaluation**, which provides the main basis for the Choice. Its main yardsticks should be aims (goals, objectives) and their implementability. To properly monitor the progress of work, the evaluation should be applied throughout the process and not only at its final stage. This points, in turn, to the importance of **feedback,** intertwined with evaluation, as an equally essential feature of the process. Finally, reminding that effective implementation determines the real value of planning, *monitoring* of its performance should be, as a rule, an integral part of the planning process, providing a major input to its subsequent never-ending cycles.

● The main core of the planning process must be followed by **Implementation**, during which the initial problems are expected to be solved (but new ones would surely appear). The real value of planning depends on its *effective* implementation and, as a consequence, it must be seen as its integral part. Its monitoring, in fact, should become, as a rule, a major input to a subsequent cycle of the never-ending process of planning.

The other key, though external, components of any planning process are:

● **Forecasting**, essential for identifying future problems and, thereby, a fundamental prerequisite of proactive planning (reliability of forecasting would usually decrease proportionally to the time span covered). Forecasting can be subdivided into:

– **demographic,** which deals with the size and structure of the future population as a function of expected natural growth and migration;
– **societal,** which deals with the most likely behavioral models of the future community;

Table 1
The three main stages required for solving decision problems

Phase	Matters to be addressed	Questions to be answered	Expected outcomes
PHASE 1 PROBLEM IDENTIFICATION (Postulation)	Diagnosis of the existing situation	Is planning intervention needed?	Identification of planning problems.
	Setting the task	Why do we need to plan?	Determination of aims and objectives can be attained through planning.
PHASE 2 PROBLEM SOLVING (Optimization	Defining development program	What is to be allocated?	Definition of ecological, economic and social needs (aspirations)
	Identifying possibilities Formulating strategies	Where is it best (optimal) to allocate? How can the aims be achieved?	Identification of development constraints and opportunities Generation potential ways, or strategies, for allocating the "program" within the "possibilities"
	Determing the means	By what means can the aims be achieved?	Indication of the necessary resources and confirmation of their availability
	Making a choice	Which of the strategies offers the most?	Evaluation of the positive and negative implementation consequences of each strategy
PHASE 3 IMPLEMENTATION AND MONITORING (Realization)	Assessing progress in transformation of the existing situation	Is it necessary to redress and strengthen the ongoing process of implementation?	Constant review of the state of achievement of the planning aims and objectives
	Establishing implications for further planning	Was the intervention successful and should it continue?	Examination of the current state of the problems to redefine them or to identify new ones

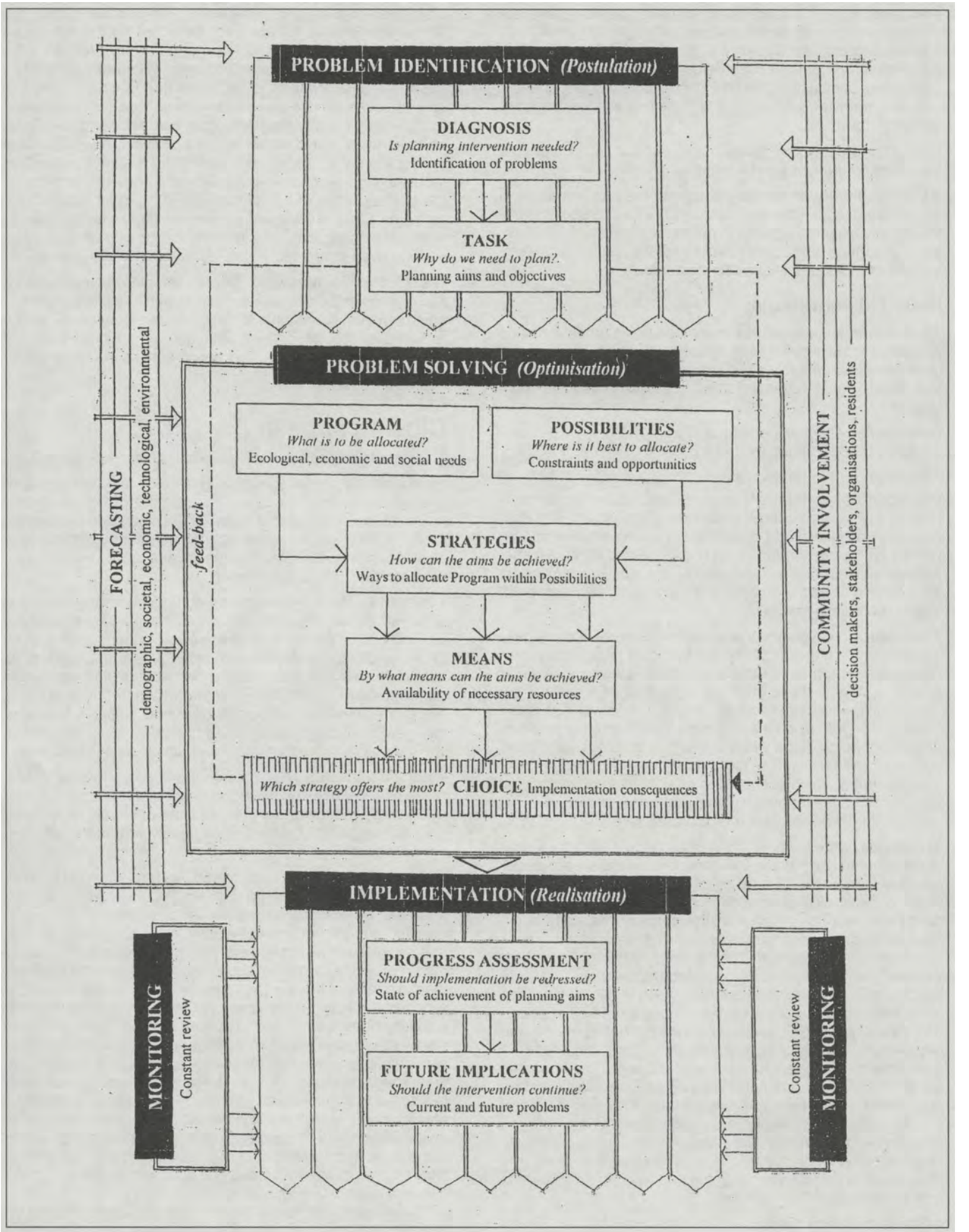

Fig. 1: Flow diagram of a simplified "model" planning process.

– **economic,** which deals with the most plausible developments of main economic activities;
– **technological**, which deals with possible significant changes and developments in such fields as energy supply, infrastructure, or industrial and agricultural technologies; and,
– **environmental,** which deals with changes in key environmental indicators.

During the process, partial results of each of its components should be confronted with forecasting.

● **Community Involvement** throughout the entire process, a major feature of participatory democracy and, as such, imperative for any planning process in democratic countries. It incorporates various public and private sectors (decision makers, stakeholders, organizations and residents).

Potential contribution

This brief presentation of the "model" planning process makes it possible to indicate those components in which planning can most efficiently contribute towards implementation of sustainable development, regarding its two previously identified, main targets:

- management of development, and
- conservation of nature.

● **Management of development**

Possibilities, where the "territorial" and "quantitative" constraints of final (or boundary) character are identified to indicate an ecologically and economically sound solution space, within which development should be contained to remain sustainable (KOZLOWSKI and HILL, 1993). The space would reflect the carrying capacity of the natural and built environments. These constraints may be:

• "**ecological**," which occur primarily when development generates "... the stress limits beyond which a given ecosystem becomes incapable of returning to its original condition and balance. Where these limits are exceeded, as a result of the functioning or development of particular ... activities, a chain reaction is generated leading towards irreversible environmental damage of the whole system or of its essential parts ..." (KOZLOWSKI and HILL, 1993); and,
• "**economic,**" which occur when final limits to development are reached due to technological problems, excessive costs and/or legal predicaments (KOZLOWSKI, 1986).

Strategies, where urban forms of development – including structure, land use pattern and transport networks – are decided. They cannot be left to be shaped only by economic forces, which often would not be concerned with taking into account such basic factors as specific physical features, culture, climate or historic traditions, to ensure development sustainability. These forces must, therefore, be guided into forms that would assist in making urban development sustainable (ecologically and economically) and enhancing quality of life. This is the field where urban design can make a marked contribution if it is expanded "... beyond individual urban spaces to the city districts, the city at large and to its regional hinterland ..." (FREY, 1999). The interactive process of designing appropriate urban forms and structures should be an interdisciplinary responsibility. From this "... it follows that urban design is not and should not be a discipline in its own right, somewhere between planning and architecture. Designing of a city or parts of it should be an operational component, from urban planning, traffic and infrastructure planning and engineering to urban landscaping and architecture ..." (FREY, 1999).

● **Conservation of nature**

"**Diagnosis,**" which concentrates on identification of planning problems and they, once established, will best reveal the present environmental threats, and "**Forecasting,**" which will be of substantial assistance in defining those expected in the future. Success in both fields, however, will greatly depend on "State of Environment" (SoE) reporting in which planners should become more involved to ensure that some key information, from the planning viewpoint, is not missing, as the reports normally lean towards satisfying typical requirements of environmental sciences. Frequently, for instance, indicators facilitating the definition of boundary environmental constraints (particularly those of a quantitative nature, which should indicate a final load a given ecosystem can carry without being irreversibly damaged), fundamental for the planners, may be missing even in very high quality SoE reports.

"**Task,**" "**Possibilities**" and "**Choice,**" within which determination of aims and objectives combined with identification of key environmental constraints to development, commonly set the required level of importance assigned to the conservation of nature to ensure, in turn, how successful its implementation would be in practice.

Closing appeal

This paper has been written on the basis of three assumptions:

• that planning cannot successfully develop and become more reliable and efficient in addressing and solving social, economic and ecological problems, faced by the communities and their environments around the world, without an understanding of all disciplines involved in this process and, accordingly, significant interdisciplinary cooperation;

• that neither such understanding and/or cooperation could be achieved without other disciplines becoming aware of planning as practiced by the planners themselves, without gaining a solid (not necessarily in-depth) knowledge, about planning, its aims, role and responsibilities, and without getting involved in the ongoing process of re-defining and/or confirming them, and this, however, would be difficult without setting a "platform" for interdisciplinary discussions and interactions, which then could be better promoted, monitored and disseminated; and,

• that a useful step in this direction would be to formulate a range of questions addressing main planning issues, followed by answers reflecting the present state of the art of planning and, at least partially, reflecting a majority view of the planning community at large.

The author's modest venture into this field intended to facilitate understanding of the basic principles upon which planning operates, by all those from the other disciplines which are interested and/or required to be involved in it. As such, surely, that can be seen as nothing more than the proverbial "scraping the tip of an iceberg." It may be rightly argued that a fundamental debate of this kind has already been going on for several decades but, so far, there has not been any leading, interdisciplinary body, committed to pursue it in, perhaps, a slightly more organized way and, more importantly, to monitor and disseminate its progress (or otherwise) and provide, from time to time, short summaries of its main results. It must not be forgotten that with the continually increasing amount of knowledge about virtually everything, it is hardly realistic to expect that individual members of disciplines affiliated with planning, would alone be able to follow such progress themselves, being overwhelmed, at the same time, by dealing with and solving their own academic or practical problems.

Therefore, a view is put forward that the World Society for Ekistics (WSE), as an almost "tailor-made" body for such a task, take a lead and move into it as soon as possible. The au-

thor appeals to the WSE to seriously consider this potential and most promising prospect.

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Fig. 1: Canada – Location of Lake Ontario. (*Source*: Government of Canada).

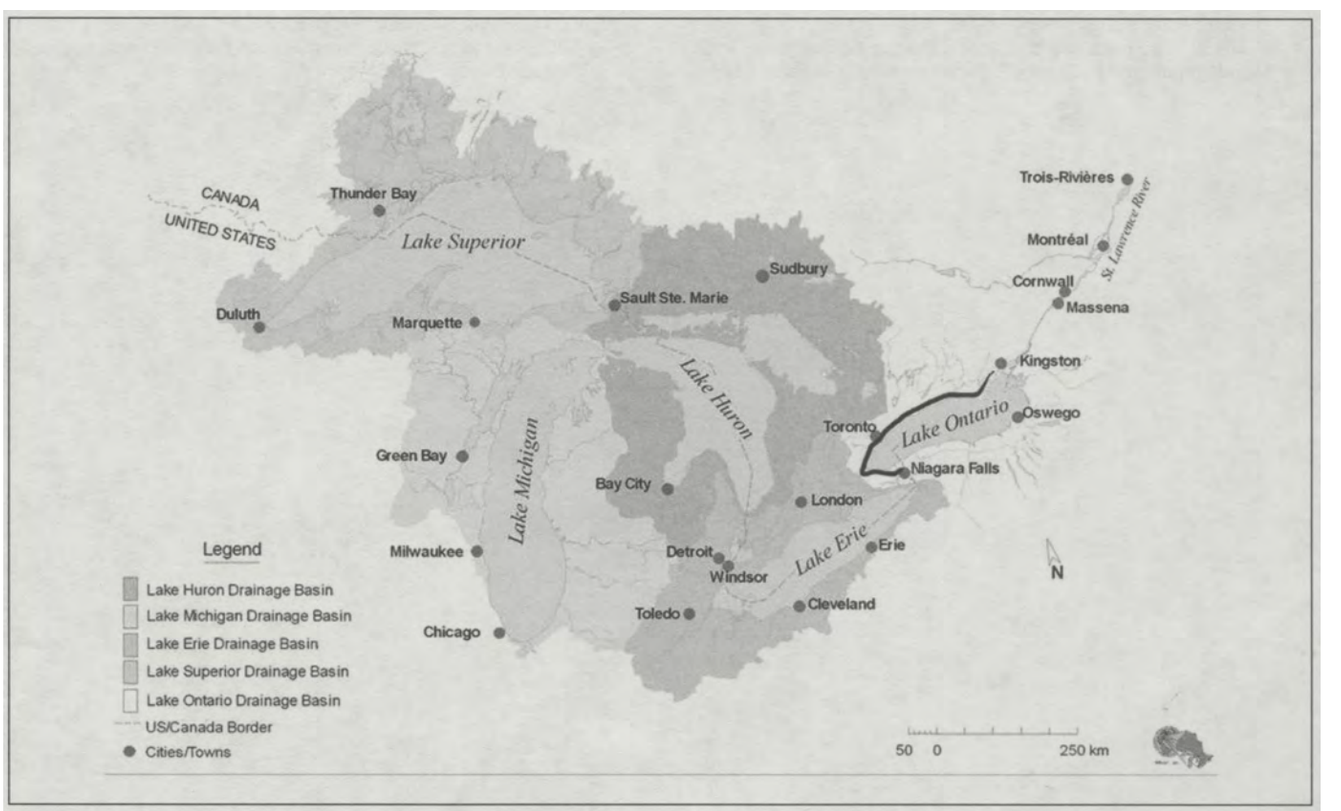


Fig. 2: Location of the Lake Ontario Waterfront Trail (black line) within the Great Lakes Drainage Basin. (*Source:* Environment Canada).

The Lake Ontario Waterfront Trail, Canada: Integrating natural and built environments

Ingrid Leman Stefanovic

Ingrid Leman Stefanovic is Associate Professor of Philosophy at St. Michael's College, University of Toronto, Canada. She is also a full member of the graduate Institute for Environmental Studies and teaches interdisciplinary courses in Environmental Decision Making and Environmental Philosophy. Research interests address how taken for granted values and perceptions affect decision making and policy development. Previously, she worked in Leman Group Inc., together with her father, Alexander B. Leman. She has co-edited a book on the Great Lakes Megalopolis. Her most recent book is entitled Safeguarding Our Common Future: Rethinking Sustainable Development *(SUNY Press, 2000). She is a member of the World Society for Ekistics (WSE). The text that follows is a slightly edited and revised version of a paper that the author intended to present at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001, in which she was finally unable to participate.*

Introduction

Years ago, famed anthropologist Margaret Mead noted the irony of our conceiving of beehives and fox's dens as natural and yet, when it comes to cities, we define them in opposition to nature. As we reflect upon the genuine meaning of sustainable development, we should recognize that the theoretical division between the natural and urban is counterproductive. The safeguarding of our natural environment is increasingly affected by the need of modifying urban behavior, and the enhancement of healthy human settlements cannot proceed in the absence of an integration and preservation of nature within our cities.

In Canada, there has been a significant effort in recent years to advance an ecosystem approach to planning, acknowledging the link between environment, community and economy. Of particular significance has been the work of the Royal Commission on the Future of the Toronto Waterfront. Their aim has been to develop an urban waterfront that would be "clean, green, useable, diverse, open, accessible, connected, affordable and attractive."[1]

The Waterfront Regeneration Trust was founded in 1992, in an effort to put these ideas into practice. Their *Lake Ontario Greenway Strategy*, published in 1995, argued for the need to protect the physical, natural and cultural attributes of the area through inter-governmental cooperation; to encourage community-driven restoration activities; to promote economic activities; and, finally, to promote greater awareness, understanding and recreational use of the waterfront.[2]

The award-winning Lake Ontario Waterfront Trail is the product of these efforts. Weaving its way for over 350 km from Niagara through downtown Toronto to Trenton, it passes through 27 cities, towns and villages; 177 natural areas; 143 parks and promenades; 80 marinas and hundreds of historic areas, art galleries and museums along the northern, megalopolitan shore of the lake. In many ways, it is an exemplary instance of a natural/urban synthesis, linking suburbs, skyscrapers and pastoral, rural landscapes (figs.1 and 2).

For the past three years, we have been involved in a research study at the University of Toronto, investigating evaluative images of the Lake Ontario Waterfront Trail.[3] The trail has been open since 1995, with gradual improvements and increased linkages continually in development. Some studies have been completed by the Waterfront Regeneration Trust to investigate meaningful places along the trail, but little has been done to explore peoples' values and perceptions of the trail. Unless we better understand how people perceive and appreciate their dwelling places, we will fail to comprehend the very foundation of their behavior – both positive as well as negative – towards the environment.

For this reason, we have undertaken a number of different initiatives, all aimed at uncovering taken for granted assumptions and affective ties to natural places like the waterfront trail. Twenty-five "end-to-enders" (those who have bicycled or hiked the trail from one end to the other) were interviewed and transcripts have been analyzed in detail. The principal investigator and her research assistants have also travelled parts of the trail, and one assistant has journeyed along its entire length, maintaining a journal of experiences and perceptions. We have hiked portions of the trail with children between the ages

of 11 and 14, and they have prepared photos, drawn pictures, written poems and essays to reflect their visions of what nature in the city ought to be like.

In all cases, a qualitative, phenomenological approach drove the project. Before I describe each set of findings, let me say a few words about the reasoning behind the methodology.

Benefits of a qualitative approach to understanding human values

While there are many advantages to employing quantitative methods in social science research, there are drawbacks as well. Standardized questionnaires, for example, compile numbers that can be impressive but, frequently, they leave out much detailed information that simply cannot be accounted for within pre-structured lists of questions and ratings.

As Canadian planner Hok-Lin Leung correctly points out, "the standard questionnaire survey ... can only entertain answers that are couched in terms of yes or no. It does not allow answers such as 'yes and no' or 'it depends' ... The question-and-answer technique may be of value in determining favoured detergents, toothpastes and deodorants, but not in the discovery of men and women."[4]

There is also a risk that the researcher's own concerns inadvertently influence the responses through the questions that are asked and, thereby, peoples' values and beliefs are not authentically heard but instead, are bounded within preconceived frameworks. Since the object is, presumably, to engage in a genuine listening of other peoples' views, the fundamental objective of these questionnaires is compromised.[5]

Phenomenology takes a different approach. Its founder, Edmund Husserl, described the aim as returning "to the things themselves" and this description was reiterated by his student, world-renowned philosopher Martin Heidegger.[6] Rather than constructing abstract, speculative theories about the world, their call was for a renewed appreciation of the lived world, as it appeared, prior to analytic constructions of meaning. Despite their different methods, both thinkers understood the importance of exposing taken for granted assumptions, and avoiding the contrived imposition of categories of meaning and preconceived frameworks in their philosophical analyses of ways of being in the world.

That same reluctance to impose our own values and to encourage each speaker to spontaneously speak to "the things themselves" as they had interpreted them along the trail, drove our interview process of end-to-enders. Our approach was to use a minimal set of questions to invite spontaneous narratives and discussion. We wanted to know, for example, where along the trail each interviewee might take a friend, if only one visit were available. Another question asked for single-word descriptors of the trail as a whole. Overall, people were made to feel sufficiently comfortable to share their stories with us in a loosely structured interview process.

Each interview lasted from one to two hours. Several days after the interviews, transcript summaries were returned to each end-to-ender for their comments. Twenty-three interviews were completed, drawing on an initial list provided to us by the Waterfront Regeneration Trust. The interviews were then coded and analyzed, using the NuDist4 (Non-numerical, Unstructured Data Indexing Searching and Theorizing) computer program for qualitative data analysis. The categories of descriptions of the trail that emerged in these analyses were not imposed in advance by the researchers but, instead, arose from the overlapping themes that were identified in a synthetic overview of all twenty-three interviews.

Our own research assistant and former philosophy student, Mat Wohlgemut, was also charged with the task of travelling the trail to engage in a phenomenological "reading" of place. The aim was not only to catalogue his explicit perceptions of place, but to deconstruct some of the implicit values and assumptions that affected those perceptions. He journeyed in different seasons – biking, hiking and sometimes cross-country skiing – and kept a log and photos of his reflections and experiences.

Finally, a phenomenological approach drove our work with children. Our interest was not to survey and quantify children's views but, rather, to elicit their own, individual perceptions and recommendations regarding the trail, as well as to hear their views on how the natural environment ought to be cared for within our human settlements. Rather than compile statistical comparisons, the object of our work with children was to hear their stories in the hope that they might see things and articulate unique ideas that adults had missed.

In all cases, our approach was to engage in an intensive, thoughtful disclosure of taken for granted values and perceptions of complex landscapes, rather than an extensive, quantitative cataloguing of narrowly defined, preconceived interpretations of place. Let me briefly describe some of our findings.

The value of the Trail: Insights from the "End-to-enders"

In our comparative analysis, coding and final, synthetic overview of the interviews with end-to-enders, a variety of descriptions of the Lake Ontario Waterfront Trail clearly emerged. Data naturally fell into thirteen categories: value or meaning of the trail as a whole; nature of the experience of water and the lake; notable places and geographical locations; list of liked places; list of disliked places; kinds of positive experiences; types of sites; types of trail experience; types of liked places; types of disliked places; answers to specific questions that were asked during the interviews; comments on local people/communities; and final recommendations.

Under each category, numerous sub-categories were identified, helping us to focus on specific descriptors arising through the interviews. The number of people interviewed who had something to say about each of these descriptors was noted on thirteen, separate tables. All of these categories and subcategories emerged from our coding and computer analysis of the *original interviews themselves,* rather than on the basis of any pre-conceived, theoretical representation. An example of a few of these tables is offered in figures 3, 4 and 5.

How did people perceive the value of the trail as a whole? Links were frequently made between the trail and a sense of being *at home*. "You can get in your car or walk to the area, and meander for a while," reflected one end-to-ender, "and it doesn't take you all day to get there." The proximity of the trail to their own, urbanized communities was highly significant. "It's here," remarked another person, "and it's at home." Several people pointed out how happy they were to avoid traffic heading up to cottage country (a regular, weekend pastime of Ontarians!) to enjoy instead a leisurely, pastoral setting within such close proximity to their own neighborhoods.

That sense of being at home was hardly incidental. Attachment to place and a sense of the importance of protecting one's home can be essential components when it comes to environmental preservation. More than a mere sentimental emotion, that sense of attachment is fundamental both to conserving the natural world but also to ensuring that humans maintain a sense of belonging and attachment to their home bases. That the trail was able, in some measure, to speak to that sense of importance of being at home is a major accomplishment of its design.

Clearly, the water itself was a huge attraction to all end-to-enders. That strong pull of the water again indicated to us much more than a narrowly conceived "aesthetic" or sentimental draw. In our view, it articulated what we perceived in the end to be a *primordial right of access to the water* by the public. Many philosophers from both Eastern and Western metaphysical traditions have recognized the essential significance of water as a primal element. In this case, the water defines the experience of the trail and, perhaps more importantly, serves as a fundamental reminder of the originary importance of dwelling alongside a lake of such size and beauty.

"Being by the water – you can't beat it," commented one interviewee. End-to-enders Ken Hughes and Mickey MacDonald mused how "Lake Ontario is the smallest of the Great Lakes but still, it's huge ... If I planted you there and you didn't know where you were, you'd have trouble distinguishing whether that was Lake Ontario or the Atlantic Ocean. The sea has a smell for sure but, at first glance, all one notices is the water itself."

A number of travellers complained about portions of the trail that left the lakeside, meandering through communities separated from direct beach access. They would watch for stretches of water that appeared through breaks in the built-up portions of the trail, and orient themselves in terms of the distance remaining before returning to the lake. Many complaints were voiced about those areas of the trail where the lakefront was absent from view. "That's what the trail *is* – a ride along the waterfront," remarked a hiker. Strong sentiments were voiced about the beauty and the elemental draw of the lake. "Its vastness," reflected an end-to-ender, "pulls my heartstrings."

Category 8: Types of trail experience.
Definition: Mentions of stretches of trail that can be said to be 'of a type', or to have a particular character, purpose, or effect.

Sub-category	# of People
➢ Designated off-road trail (e.g., Martin Goodman trail)	13
➢ Well-surfaced trail (e.g., paved, fine gravel, & similar)	8
➢ Poorly designated trail (e.g., through Scarborough)	11
➢ Poorly maintained stretches (e.g., potholes or debris on trail)	4
➢ Poorly surfaced trail (e.g., sand; coarse gravel; mud)	7
➢ On-road stretches of trail	23
➢ Highly trafficked area (e.g., Highway 2)	22
➢ Dangerous or frightening (e.g., with no bike lanes)	13
➢ Good or OK bike lanes or shoulder (e.g., country roads)	6
➢ Bad bike lanes or shoulder (e.g., narrow, unmarked lanes)	3
➢ Low traffic stretches of trail (e.g., Countryside)	4
➢ Straight road (e.g., along Murray canal)	3
➢ Biking vs. Walking stretches of trail (e.g., Rattray Marsh)	16
➢ Difficult or steep stretches (e.g. hilly part on Kingston Rd)	7
➢ Busy stretches of trail (e.g., along Toronto harbourfront)	9
➢ Residential stretches of trail (e.g., through Mississauga)	13
➢ Urban stretches of trail (e.g. Downtown Toronto)	13
➢ Rural stretches of trail (e.g., Newcastle to Port Hope)	16
➢ Peaceful or remote stretches of trail (e.g., Orchard Grove Rd)	7
➢ Noisy stretches of trail (e.g., in urban or trafficked areas)	7
➢ Scenic stretches of trail (e.g., close to the lake)	3
➢ Boring stretches of trail (e.g., dull scenery; straight road)	13
➢ Lakeside stretches of trail (e.g., Toronto Waterfront)	14
➢ Stretches of trail far from the water (e.g., through Scarborough)	11
➢ Stretches with a sense of linkage (e.g., Martin Goodman Trail)	1
➢ Detours or side trails (e.g., in order to get close to the Lake)	18
➢ Stretches of trail to move through quickly (e.g., boring scenery)	6

Fig. 3: Sample table compiled from End-to-Ender Interviews: Category 8: Types of trail experience.

Category 9: Types of liked places.
Definition: A cross-referencing between the basic typology of places, and the mentions of places that were particularly enjoyed.

Sub-category	No. of People
➢ Stopping places (e.g. lunch spots, or places to overnight)	8
➢ Places with Amenities	14
➢ Social or people places (e.g., busy parks or friendly towns)	7
➢ Scenic places or stretches (e.g., nice view of water, pleasant scenery)	6
➢ Places named as landmarks (e.g., Humber Bridge as gateway to Toronto	2
➢ Industrial places (e.g., factories, nuclear facilities, etc.)	10
➢ Well-signed places	1
➢ Historic places (e.g., Old Oakville)	14
➢ Architecture & buildings (e.g., Victorian homes)	7
➢ Museums and Monuments	7
➢ Natural places (i.e. all places where nature is prominent)	22
➢ Natural or undeveloped setting	3
➢ Places with vegetation (e.g., treed places)	7
➢ close to, or view of, the lake (e.g., waterfront parks)	18
➢ Places to learn about nature (e.g., information boards)	4
➢ Wetlands (e.g., Rattray Marsh; Cootes Paradise)	15
➢ Conservation or regeneration areas	12
➢ Places to see fish and wildlife	11
➢ Ecologically destructive places (e.g., polluting facilities)	2
➢ Small towns and villages (e.g., Cobourg, Port Hope)	13
➢ Town and City parks (e.g., Victoria Park in Cobourg)	18
➢ Starting and ending places (e.g., Niagara-on-the-Lake)	1
➢ Designated off-road trail (e.g., Martin Goodman trail)	7
➢ Well-surfaced trail (e.g., paved, fine gravel, & similar)	6
➢ On-road stretches of trail	6
➢ Residential stretches of trail (e.g., through Mississauga)	11
➢ Urban stretches of trail (e.g. Downtown Toronto)	9
➢ Rural stretches of trail (e.g., Newcastle to Port Hope)	12
➢ Peaceful or remote stretches of trail (e.g., country roads)	6
➢ Stretches with a sense of linkage (e.g., Martin Goodman Trail)	1
➢ Detours or side trails (e.g., in order to get close to the Lake)	13

Fig. 4: Sample table compiled from End-to-Ender Interviews: Category 9: Types of liked places.

Category 10: Types of disliked places.
Definition: A cross-referencing between the basic typology of places, and the mentions of places that were particularly disliked.

Sub-category	No. of People
➢ Places with inadequate washroom facilities	1
➢ Unfriendly or private places (e.g., private property)	6
➢ Boring places or stretches of trail (e.g., no scenery)	12
➢ Industrial places (e.g., factories, nuclear facilities, etc.)	7
➢ Suburban places (e.g, urban sprawl)	2
➢ Poorly-signed or confusing places (e.g., break in the trail)	11
➢ Natural places (i.e. all places where nature is prominent)	5
➢ Wetlands (e.g., Rattray Marsh; Cootes Paradise)	1
➢ Conservation or regeneration areas	4
➢ Ecologically destructive places (e.g., polluting facilities)	3
➢ Starting and ending places (e.g., Niagara-on-the-Lake)	4
➢ Poorly designated trail (e.g., through Scarborough)	10
➢ Poorly maintained stretches (e.g., potholes or debris on trail)	3
➢ Poorly surfaced trail (e.g., sand; coarse gravel; mud)	3
➢ On-road stretches of trail	20
➢ Highly trafficked area (e.g., Highway 2)	19
➢ Dangerous or frightening (e.g., with no bike lanes)	12
➢ Bad bike lanes or shoulder (e.g., unmarked lanes)	2
➢ Straight road (e.g., along Murray canal)	2
➢ Places that are not bicycle-friendly (e.g., Rattray Marsh)	7
➢ Difficult or steep stretches (e.g. hilly part on Kingston Rd)	4
➢ Urban stretches of trail (e.g. Downtown Toronto)	3
➢ Noisy stretches of trail (e.g., in urban or trafficked areas)	6
➢ Stretches of trail far from the water (e.g., Scarborough)	9

Fig. 5: Sample table compiled from End-to-Ender Interviews: Category 10: Types of disliked places.

While the vastness of the lake and its spectacular beach vistas were essential to the trail experience, other aspects of the significance of water arose through the interviews. It was not only manicured, picturesque scenes of nature that attracted end-to-enders. The wildness of wetlands and marshes, as well as the proliferation of winding rivers and creeks that they

Fig. 6: Rattray Marsh, west of Toronto. (Courtesy: M. Wohlgemut).

Fig. 7: Humber River Bridge. (Courtesy: M. Wohlgemut).

encountered, left strong impressions upon people. There was an attraction of the "undeveloped" areas – places where a mathematized sense of human ordering of the environment gave way to the spontaneous presence and grace of the natural world (fig. 6).

The spectacle of working canals also provided for a multifaceted experience of travelling the trail. The *interface* of water and built structures came up during our conversations in various ways: a bridge over the Humber River (fig. 7 and 8) provided for a dramatic sense of gliding *above* the water, and being sheltered at the same time by the geometry artistry of the cables and the soaring height of the built structure. The lake became much more than mere vista in these recountings, as end-to-enders reflected upon the historic, economic and ecological importance of their varied experiences of the water.

Also highly valued was the sense of *diversity* along the trail.

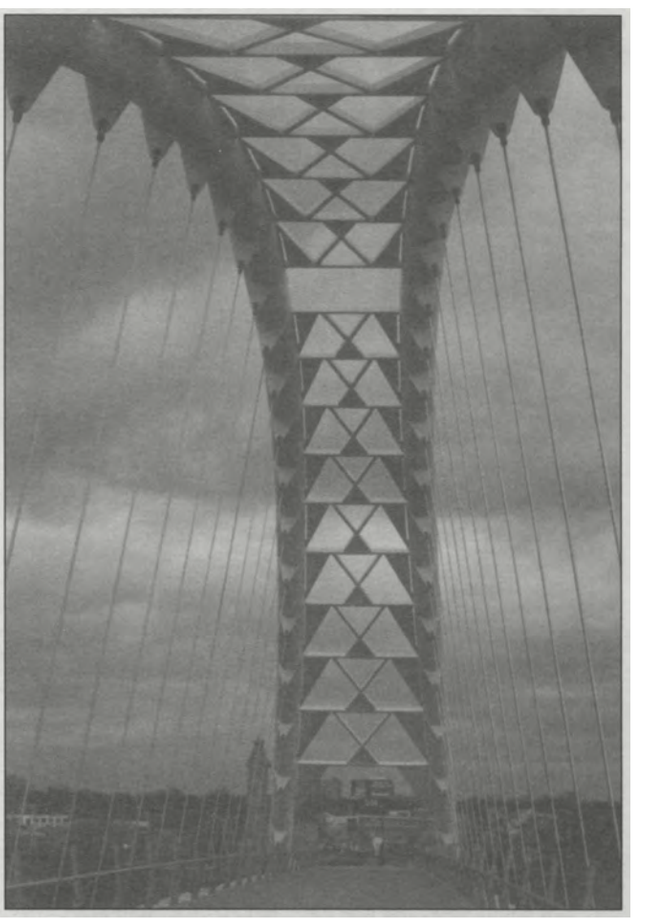


Fig. 8: Humber River Bridge. (Courtesy: M. Wohlgemut).

Fig. 9: Darlington Park and Nuclear Generating Station. (Courtesy: M. Wohlgemut).

"You could be in a marsh, a city, a cornfield, all in one day," remarked one participant. Interestingly, many people were drawn to travel this particular trail because they were hikers and bikers, used to wilderness and nature trails but fascinated, in this case, precisely by the *mix* of the urban and the natural. Certainly, the more undeveloped settings were popular among the end-to-enders but, at the same time, they appreciated the "social or people places," the towns and city parks, and the varied architectural landscapes as well.

Different sites that were experienced ranged from the industrial to suburban, from wetlands to historic landmarks, from the urban to the rural. From "stopping places" to "stretches to go through quickly;" from "noisy" to "boring stretches" of the trail; from areas of regeneration to ecologically destructive places, the sheer variety of landscapes remained as a strong memory among the end-to-enders. When prompted to describe memorable sounds along the trail, recollections extended from traffic noise to train whistles to the songs of birds, the wind and water lapping along the shores.

What kinds of places were liked and disliked? To no one's surprise, "natural places" were most appreciated, especially those close to the lake. Wetlands were popular, as were town and city parks, conservation areas and rural stretches of the trail.

However, the story is not quite so simple. Built-up areas were highly valued as well. A large number of people interviewed welcomed the urban stretches of trail, the historic architecture, museums and monuments and even industrial areas. Parts of the trail are *not* particularly aesthetically pleasing and yet a number of people found the *contrasts* between industry and nature to be appealing. There was also a sense of respect for industrial backyards as *working waterfronts* and even a sense of wonder as one passed the Darlington Nuclear Generating Station, surrounded by regenerated parkland (fig. 9).

As much as urban areas were appreciated, disliked places frequently included on-road stretches of trail, particularly in highly-trafficked areas. Poorly signed or confusing places were also high on the list of disliked places. Not surprisingly, people were uncomfortable in areas where they felt unsafe or disoriented. In our view, notions of safety and belonging point to primordial rights that must be respected and maintained by developers of the trail.

A huge amount of data was generated by these interviews. Overall, there was a sense that the Lake Ontario Waterfront Trail provided a unique opportunity for a *connected, continuous experience* of the lakeside, megalopolitan development while, at the same time, it revealed a large *diversity* of human settlement forms and natural settings. People welcomed this opportunity for a plurality of experiences, and the mingling of the urban and natural landscapes, all within easy accessibility from their homes. Recommendations ranged from supporting initiatives to bring all sections of the trail closer to the water's edge, to improving signage and trail surface, and raising awareness among the general public about the existence and assets of the trail. Today, in an era of specialization and fragmentation, the notion of *integrating* communities along more than 350 km. of trail and, at the same time, of interweaving *diverse,* natural settings within urban landforms is unique. According to the end-to-enders, such instances of vibrant, fitting placement between ecology and human settlements deserve to be protected and enhanced.

Towards a phenomenological reading of place

Both the principal investigator on this project, as well as each research assistant, travelled various portions of the trail. One research assistant, Mat Wohlgemut, was charged with the specific task of completing the entire journey from one end to the other, and maintaining a travel log. Collectively, many of our reflections converged with those made by other end-to-enders. On the other hand, our own journeys, undertaken with the specific, phenomenological task of deconstructing significant moments of the lived experience of travelling the trail, offered new possibilities of deliberating upon our identification of meaningful places.

All along the trail, we noted the competing interests of the water and the highway that follows and indeed constitutes major portions of the trail. "The noise and rush and experience of travelling on a roadside," writes Mat in his log, "was repeatedly contrasted with an experience of travelling along the water." The soundscape itself vacillated between the noise of traffic to the sound of the waves. In an important sense, this dual pull defined the essence of this trail that straddles both the natural and the urban worlds.

Mat identified a number of different relationships between the water and the land that evolved in his travels and that we see to be phenomenologically significant. Some areas provided for "an entryway" and *immediacy of access* to the lake. This was sensed along beaches and even along concrete walkways that straddled the shores and were low enough to allow for the experience of the spray of the waves as they hit against the barriers. (Mat writes: "Coronation Park: no barriers to the water. You can walk right in...")

Other areas provided for a more nuanced, "dialectical" relationship to the lake. Walking along boardwalks through a marsh, or over bridges, one hovers *over* the water – suspended above it, while at the same time, conscious of its nearness and full presence. Piers and spits provide for a similar interplay: one feels as if one is *on* the water, yet sheltered and protected by being bonded to the coast. It is not merely *water as spectacle, as vista* that attracts one to the lake – although that aspect can be alluring as well.

The point is that the human experience of being near the water is more complex than one might expect. In fact, there is a special revulsion that accompanies the occasions during hot, summer months when a proliferation of algae accumulates due to chemical pollutants in the lake and a potent stench permeates the beaches. At those times, one is repelled away from the water, at the same time that one lives the injustice of being denied access to what should be a pleasant experience of lingering by the shore.

Aside from the water/land interplay, another relation that emerged was between geometrical and more "wandering" places along the trail. At times, there is a strong sense of linearity of the sidewalk or road. When these stretches are long and uniform, they can be dull and uninviting, particularly for the hiker. "Space is suddenly geometrical," writes Mat, "ready to be translated into the time required to get to the stoplight." Space and time become point-oriented and, frequently, the destination becomes more important than the journey. If one is biking along these routes, one speeds through them, head down, as quickly as possible.

On the other hand, the curve of the beach or the wander of the path invite exploration, meditation and the experience of lingering. "A 'wandering path,'" Mat muses, "is both a path that moves and rolls with the contours of the landscape, and a path *for wandering*, free from a rigid structure and plan." Most of the time, such areas were inviting, as places of solitude, peace and, in Mat's words, a "shift from the 'what's next' of progress through linear time, to the 'what's here' of being *present*." In these areas, one dismounts while biking, compelled by the environment to slow down. Mat's reflections here are instructive:

> The system of winding trails and boardwalks brought a kind of being-in that was distinct from the flat linearity of the highway. Instead of the tendency towards one axis of the imagination (straight forward), I am surrounded by, and asked to explore full three-dimensional space – above, below, in front, behind and all around me. Each field of interest is not presented as a flat surface (a façade) but as having texture and depth. Behind the first veil of leaves lie the branches, with their coarse and wrinkled bark, and beyond that another tree, with the promise that there might be a small path that could take you deeper, back there, where there seems to be a low rise. And what lies beyond that? A marsh? A treasure trove of fragrant, musky mushrooms? The visually-oriented cue of having 'layer upon layer' of perspective means that there are layers of *possibility* open to me. The 'mystery' is played out in the tension between what is hidden and what is revealed.

Marshlands that one encounters similarly shelter a "dense mystery" of wildlife, plants and layers of mud, reeds and algae. Untamed nature still rears its head in these moments, reminding one of the richness of the uncivilized. Planners must be reminded that these kinds of areas are essential to the meaningful human experience of nature in the city.

Another texture of possibilities arises in historical areas, where layers of meaning reveal a depth of past traditions. The old town of Oakville, west of Toronto, provides for a living experience of 150-year-old houses, as one meanders off the main trail through tree-covered streets adjacent to the lake. One moves more slowly here, drawn towards the past through a landscape of spatial and temporal contrasts.

Many of the end-to-enders, as well as each of us who have travelled the trail, have been drawn to specific landmarks as well. Architectural and environmental "monuments" help to define the journey. Whether it is the CN Tower looming in the distance or nexus points, such as Sheldon Lookout (fig. 10), particular places become *centers* of meaning and points of orientation. Kevin Lynch's famous elements of city images and legibility – identified as paths, edges, districts, nodes and landmarks – found some expression in the narratives of the end-to-enders and in Matt's reflections.[7] In our case, it seemed that special emphasis was given to districts or areas that had a particular character of their own, and landmarks that helped to mark the journey and define stronger memories (table 1).

Most of the end-to-enders travelled the trail during the spring and summer months, but Mat travelled year-round. In his journal, Mat writes how "it seems that weather ('atmosphere') is fundamentally disclosed along with a place, such that a place is unimaginable without its accompanying weather. Landscapes always have a sky, a sense of the air and the light, and the feeling of a season – one might be tempted to say that these elements go a long way to define the mood of an environment." Environmental psychologists, as well as some philosophers, have reflected upon the importance of weather when it comes to questions of mood and ways of being in the world. Clearly, the weather is hardly something that we can control but it is important to remember that its characteristics can help to fundamentally define the experience of place, and that places themselves can be revealed differently, depending upon the atmosphere and the weather. (Compare, for example, figure 11, a photograph of Ratttray Marsh west of Toronto, with figure 6, the identical spot in a different season).

Developing the trail by keeping a variety of seasons and weather conditions in mind seemed to us to be recommended. How do different trail conditions change with snow vs. summer conditions? Are there places where one can seek shelter dur-

Fig. 10: Sheldon Lookout, nearing downtown Toronto. (Courtesy: M. Wohlgemut).

Fig. 11: Rattray Marsh in spring. (Courtesy: B. Sexsmith).

ing storms or intense heat? These kinds of questions should be part of the planning process of these kinds of extended trails.

Low-density housing areas were found by us to be sterile and "interchangeable." Such "suburban wanders" with garden-style arrangements were described in Mat's journal as places that "could have stood in for one another quite easily." The anonymity of such areas affects the hiker particularly, since there is little to hold one's interest for any extended length of time. When one feels that the area that one is travelling through is not distinctive, one senses little progress or reward for the journey.

Overall, we found three groupings of places: the uninviting, inviting and "contested" places where feelings were mixed (table 2). As the end-to-enders did, we felt out of place in noisy, highly trafficked areas, or places where signage was not clear or lacking. "Utilitarian" environments were unwelcoming and ranged from long, anonymous stretches of road to linear, "master-planned" residential communities. Unapproachable, "blocked" places emerged as private neighborhoods where one was made to feel unwelcome. Mat found places of social inequity where income disparities arose to be particularly disturbing to him as instances of environmental injustice.

The inviting spots ranged from wandering, wilder, mysterious places like marshlands to conservation areas teeming with geese and fish; to vibrant urban centers like the Harbourfront area of downtown Toronto; to small town centers with their rich histories of place; to areas of immediate access to the lake. Solitary places could either be inviting or forbidding, depending upon the location. Other kinds of "contested" places were defined in terms of whether one was biking or hiking that particular part of the trail.

From winding country roads to wetlands and cities, the trail reveals many facets of an urban/nature dialogue. At the end of his travels, Mat reflects: "The line of my journey is written in the lines of my narratives: trails, factories, houses, suburbs, docks, harbours, nooks and niches, highways and byways and horse tracks, creeks and wetlands, forests, fields, bridges, cliffs, beaches, potholes, gravel, asphalt, dirty, lunches in the sun and the sometimes near, sometimes distant presence of the immense and immutable lake. This is, indeed, a well-storied trail."

Impressions of children

Our work with children is still underway although already we have spoken and hiked with children from five classes and compiled some of their impressions. Once again, the aim was not to quantify children's perceptions about nature but, rather, to see to what extent their impressions complemented or added to our work with adults. A major part of our work was to obtain their sense of what nature in the city *is,* and what it *should* be like.

Perhaps not surprisingly, to some degree, the nature/urban divide is already inculcated within young teens. Thirteen-year old Kathryn notes: "Nature in the city ought to be less urbanized ... The industrial aspects of the city took away the beauty of nature." Unaware of the environmental costs, the same girl felt that nature should be well-manicured within urban settings. "People should keep their lawns clean and mowed for the sake of the other people in the city; one unmowed lawn can ruin a whole street's beauty!"

Many children saw nature in terms of flowers and trees, and aesthetic descriptors frequently came up. Children were frequently perturbed by garbage, litter and pollution. "I would improve the garbage problems," wrote Jessica. "The garbage kinda [sic] wrecks the nature part of the trail because it wrecks the view."

At the same time, there was a strong sense of the value of preserving natural environments in some form. "Nature in the city is slowly dieing[sic]," wrote Jessica. She concludes: "As more houses and buildings are being built, nature is becoming more scarce. I think that it is good to have the Waterfront Trail so people who walk it get a good taste of the remaining nature."

Many children were bothered by the notion of environmental degradation and despoliation. Stephanie told us how she was "walking along the docks and I saw immense amounts of decaying, dirty algae and bacteria. There were actually many fish swimming in circles on their sides because they cannot function properly because of the tremendous amounts of pollution entering Lake Ontario. I don't think that I will ever be able to swim in Lake Ontario without worrying if I will get cancer."

Thirteen-year-old Tamara was upset by the impact of new housing developments on wildlife. "The only places which I find to really be disasters are new developments such as ... the "French Country Homes." In many of these types of cases, forests are completely wiped away and this is done unnecessarily. Even if houses were planned to be built," she concludes, "it isn't mandatory to get rid of everything natural." In her later reflections, she referred to such places as "evil suburban developments!"

Most of the children enjoyed the trail the most, in areas close to the lake. We enjoyed watching where they played spontaneously or lingered longest. Throwing stones onto the lake was a favorite pastime, as was scrambling along the rock jetties (fig. 12). Simply watching how much time children spent playing upon these jetties drew our attention to the popularity of piers and spits along the trail. All of these places that extend *onto* the water provide for a special adventure of interacting with the lake in a more enriching way than as mere spectacle.

In almost every case, the children's recommendations were to ensure that the trail remained close to the water. As thirteen-year-old Nicola wrote, "nature in the city ought to be closer to the lake ... Much of the Waterfront Trail is along Lakeshore Road and not, actually, along the lake. It is nice to have houses built next to the lake, but I think it is more important to have a nice trail for people that[sic] can't afford housing by the lake."

The wide range of data collected about children's perceptions ranges from drawings to photos, and even to GIS maps, generated by the Grade 9 class at St. Mildred's-Lightbourn School in Oakville (fig. 13). By clicking on the items blocked on the map, one can survey each child's evaluations and explanations as to why a photograph was taken at a particular spot. Much work remains to be done to fully investigate this data but already it is clear that children have much to contribute to our understanding of the meaning of a waterfront trail, and the interface between the natural and built environments.

Conclusions and recommendations

Primarily based on the work with end-to-enders and by virtue of travelling the trail ourselves, we have evolved numerous recommendations that will be forwarded to the Waterfront Regeneration Trust for their consideration. The City of Toronto Planning Department has also received our report in response to their invitation to prepare recommendations specifically relating to the portion of the trail that runs through the downtown, lakefront area.

While the recommendations are numerous and, in many cases, site-specific, a number of them are more generic and provide some food for thought for anyone interested in developing more natural cities. Some of these suggestions include the following:

Table 1
The Lake Ontario Waterfront Trail: Physical, geographical designations

Nodes and landmarks	Regions and districts	Paths and roads
Lakefront parks	Suburban	Country roads
Cemeteries	Urban	Trans Canada Highway 401
Tourist attractions	Rural	Lakeshore Road #2
Downtowns	Conservation areas	Motel Strip
Small towns	Marshlands/Wetlands	
Lakefront promenades	Industrial backyards	
	Agricultural	
	Beaches	

Table 2
The Lake Ontario Waterfront Trail: Experiences of place

Experience	Place
Un-inviting Places	Highly trafficked
	Unsigned or poorly signed places
	"Utilitarian," efficiency-oriented places
	Unapproachable, blocked places (e.g. areas of private property, like Wilmot Creek)
	Invented, "master-planned" and "branded" places
	Dusty, uncomfortable places
	Noisy places
	Long, anonymous, linear/geometrical stretches
	Inequitable places (income disparities)
Contested Places	Marginal places
	Unexpected places
	Solitary places
	Biking vs. Hiking places
	Points of intersection of "worlds"
Inviting Places	Meandering/wandering places
	Natural stops/resting places
	Elevated places (above roadways or water)
	Wild places
	Places identified with wildlife (geese, fish, birds)
	Vibrant, urban places
	Vistas
	Liberating places, with clear, waterfront access
	Quiet, peaceful places
	Significant landmarks
	Complex (historical and environmental "layering") places
	Dramatic places
	Historical places
	Working waterfront
	Lingering places
	Invisible functions of place (hidden maintenance needs)
	Mysterious places (marshes, etc.)
	Easy-flow places
	Wooded places
	Well-signed places
	Diversity of place/sense of discovery
	Beginning and ending places

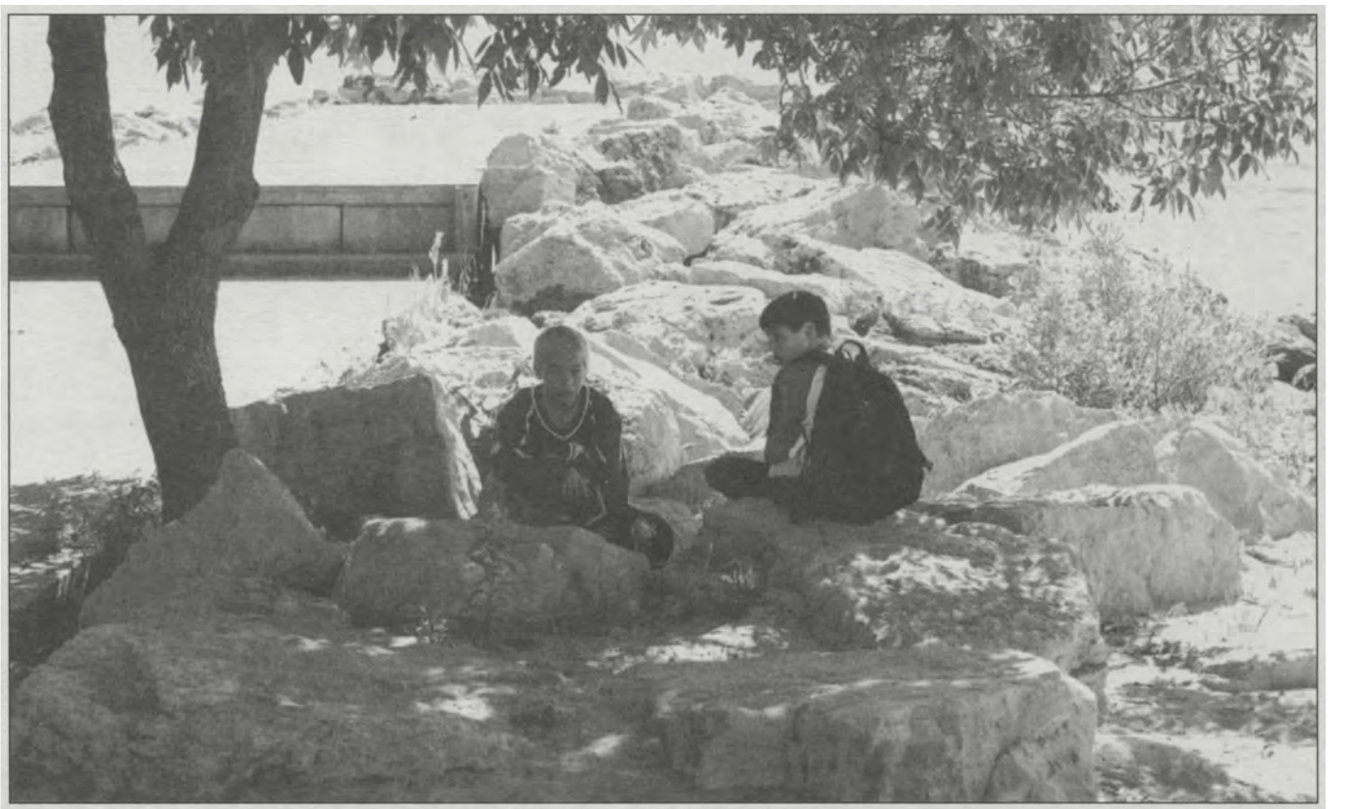


Fig. 12: Grade 6 children on rock jetty, Mississauga, west of Toronto. (Courtesy: B. Sexsmith).

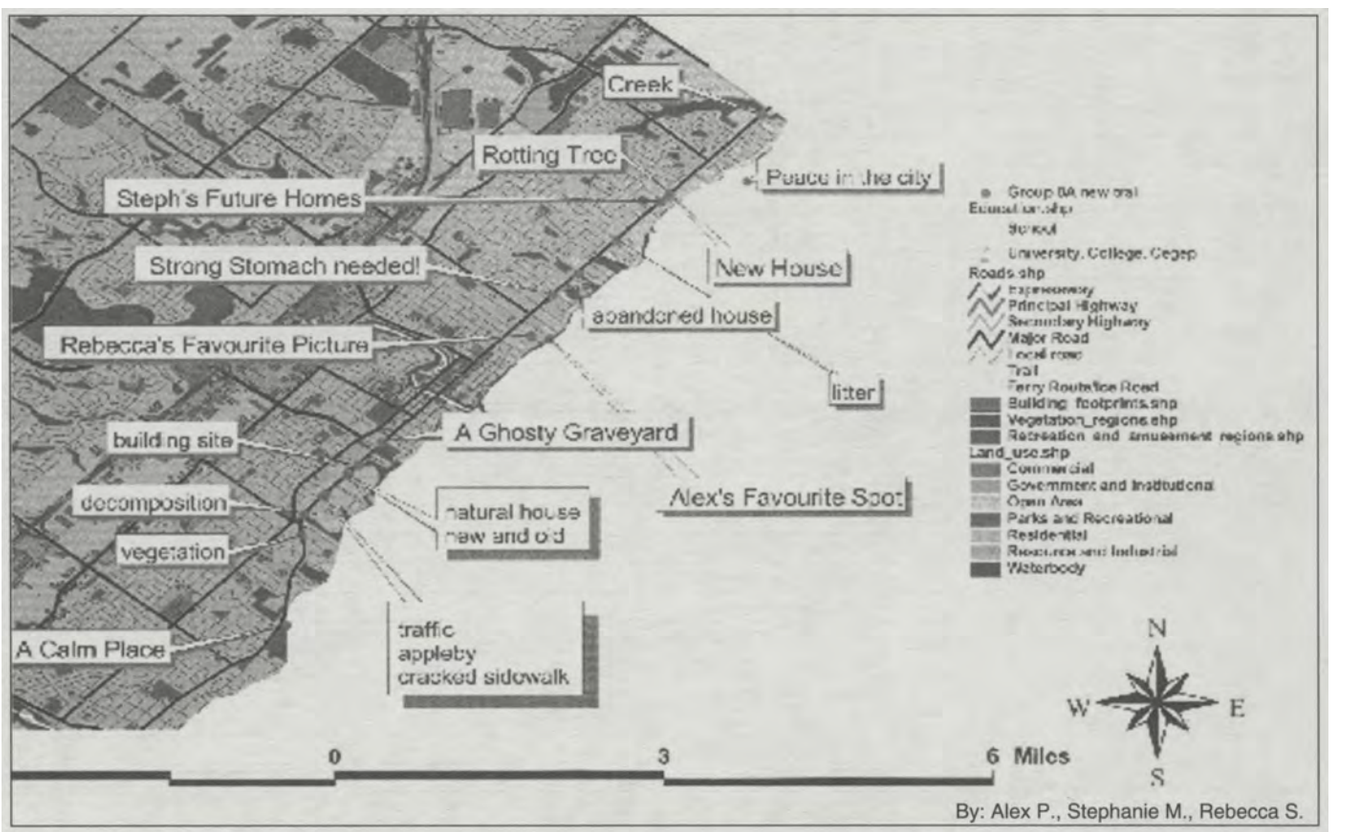


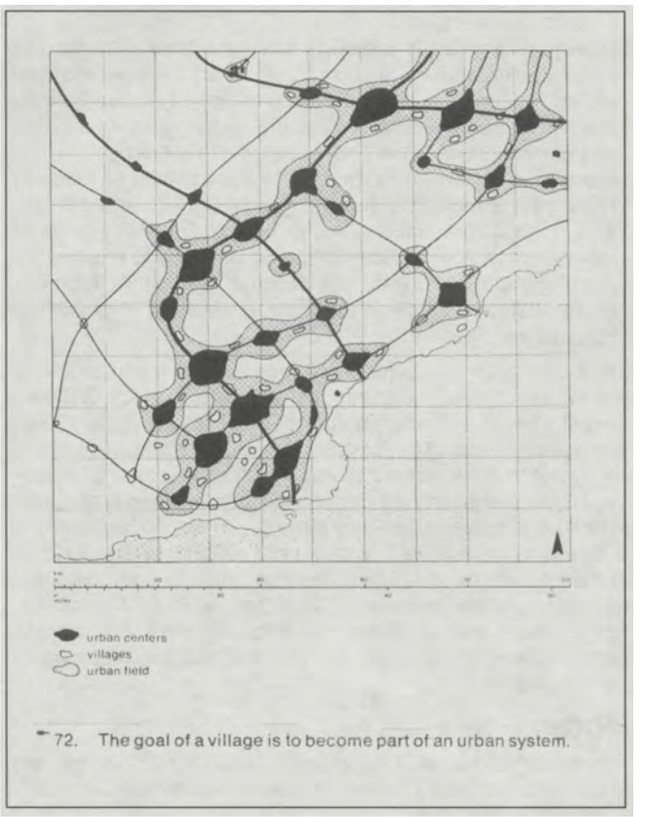
Fig. 13: Sample GIS map, compiled by Grade 9 students of St. Mildred's-Lightbourn School.

- **Ensure that the trail is easily accessible as a public amenity** for people of varying abilities, incomes and ages. Inter-modal transportation systems should ensure comfortable access to the trail entry points.
- **Preserve diversity**. Recognize that, in addition to manicured walkways, people value when layers of history and ecology are evident. Even industrial areas can have their charm.
- **Ensure that private developments do not block visual and physical access to the lakefront.** Interaction with the lake is a primordial right of all citizens.
- **Keep the trail away from traffic, whenever possible.**
- **Route the trail as close to the lake as possible at all times.** Have a long-term expropriation plan to ensure proximity to the lake of the dedicated trailway.
- **Preserve the mystery of the "untamed."** Efficient, master-planned designs frequently provide for well-manicured environments but deny the complexity of our environments. Finding ways to preserve "untamed" nature rather than to merely create utilitarian spaces is a major challenge to future development of the trail.
- **Think non-geometrical.** Long, anonymous stretches of trail are tedious. Wandering trails – and even alternate routes – provide people with a choice as well as more opportunities to linger and to enjoy a richer experience of place.
- **Provide for resting/lingering places:** Nodes that invite the visitor to stop and reflect on his or her surroundings are an important part of providing for a sense of place. Such nodes can be defined by benches, water fountains, shaded areas under treescapes, larger seating areas and other similar stopping places where one is not required to be a consumer but simply can slow down to admire the lake and the surrounding landscape.
- **Build on local histories of place and existing landscapes.** Mapping out local histories, narratives and stories from citizens and recognizing the opportunities that are revealed for design that arises *from* the landscapes rather than being *imposed upon them* are ideas of central importance. Both ensure more responsible and, eventually, sustainable design.
- **Protect and create greenspaces and parks along the waterfront**. Virtually all groups whom we interviewed valued nature highly and wish to integrate much more frequently wild and built environments in our cities.
- **Find ways of encouraging *diverse* relationships to the water.** Piers, spits, bridges, small waterfalls and fountains, ponds, rivulets, creeks, marshlands all engage us with the water in different ways. People love the water. Ensure a rich and diverse experience by imagining ways in which one can be with the waterfront: above it, on it, as well as appearing as beautiful vista.
- **Create new experiences for nature and wildlife experiences.** Birds, fish and animals are intriguing and people mourn sterile environments where local species are at risk.
- **Create legible spaces through discerning physical features of design**. The need for a sense of direction and orientation is fundamental. However, just placing signs to orient people is aesthetically displeasing and depletes the experience. Finding ways to guide people through physical design – different trail surfaces or placement of landmarks, for example – helps to maintain a sense of belonging with decreased environmental stress.[8]
- **Design acoustically pleasing environments**. We tend to forget the importance of sound, both as environmental stressor as well as a source of peaceful sense of place. Finding ways to decrease the noise of traffic – moving water is excellent – is important to the future design of the trail.
- **More actively promote the trail.** Efforts should be made to raise awareness about it in the general public, the schools and in the communities along its length. Some plaques or other ways of communication should be found to ensure that people who are on the Lake Ontario Waterfront Trail are aware of its existence as a unique, pedestrian link between Niagara and Trenton.

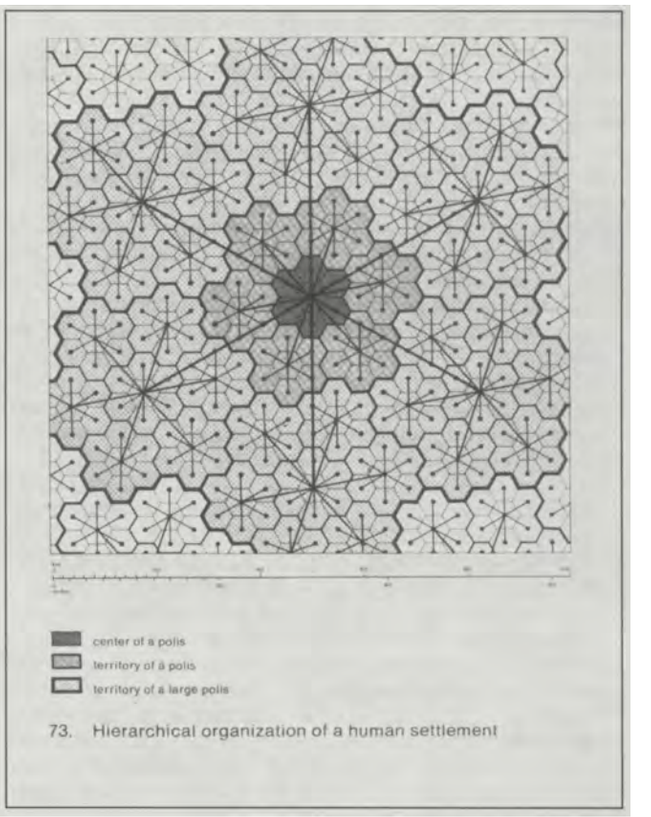
Finally, we felt that it is important to indicate to local communities through signs or plaques that they are part of a 350-km. long stretch of trail, linking a megalopolitan settlement form that straddles one of the largest lakes in the world. Too often, we forget that we belong to many different scales of settlement, from neighborhood through city to megalopolis and, ultimately, to Ecumenopolis and a living planet. A development such as the Lake Ontario Waterfront Trail serves to remind us of the importance of linkages between natural and built environments, as well as between built and ecological communities of varying scales. Such reminders are rare but deserve to be highlighted to serve as a guide in the future planning of cities worldwide.

Notes

1. S. Barrett, *A Decade of Regeneration: Realizing a Vision for Lake Ontario's Waterfront* (Toronto, Waterfront Regeneration Trust Corporation, 2000), pp. 4-5.
2. See *The Lake Ontario Greenway Strategy* (Toronto, Waterfront Regeneration Trust Corporation, 1995).
3. The study has been funded by the Social Science and Humanities Research Council of Canada (SSHRC). Research assistants were: Mat Wohlgemut, MA (Phil.); Richard Oddie, Ph.D. candidate at the Faculty of Environmental Studies, York University; Sarah King, Ph.D candidate at the University of Toronto; and Lois Lindsay, MA (Geography).
4. See Hok-Lin Leung, *City Images* (Kingston, Ontario, Ronald P. Frye & Company, 1992) pp. 5, 7. For more discussion on this idea, see also chapters 3 and 9 of my own *Safeguarding Our Common Future: Rethinking Sustainable Development* (Albany, NY, State University of New York Press, 2000).
5. For more information on qualitative research, see John W. Creswell, *Qualitative Inquiry and Research Design: Choosing Among Five Traditions* (Thousand Oaks, CA, Sage, 1998) or Steven J. Taylor and Robert Bogdan, *Introduction to Qualitative Research Methods*, 3rd ed. (New York, Wiley, 1998).
6. See Edmund Husserl, *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy*, trans. F. Kersten (The Hague, Martinus Nijhoff, 1983), p. 164. Also Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson (New York, Harper & Row, 1962), p. 58. For a more detailed description of phenomenology, please see my *Safeguarding Our Common Future: Rethinking Sustainable Development, op. cit.*
7. See Kevin Lynch, *The Image of the City* (Cambridge, MA, MIT Press, 1960).
8. For more on this, see my article "Temporality and architecture: A phenomenological reading of built form," *Journal of Architectural and Planning Research*, II:3, Autumn 1994, pp. 211-225. See also my book, *Safeguarding Our Common Future: Rethinking Sustainable Development, op. cit.*

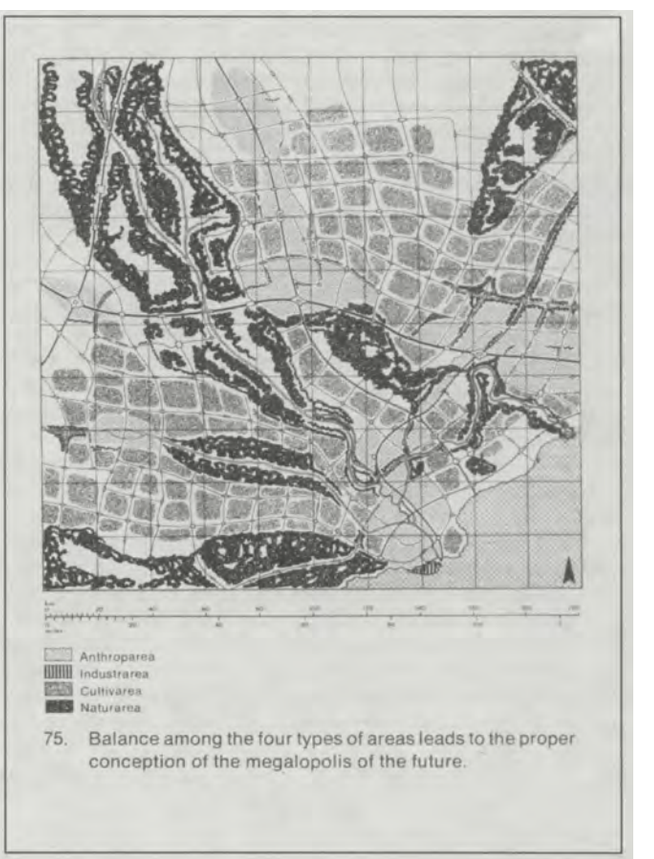


72. The goal of a village is to become part of an urban system.



73. Hierarchical organization of a human settlement

74. The metropolis of the future



75. Balance among the four types of areas leads to the proper conception of the megalopolis of the future.

(Source: C.A. Doxiadis, *Action for Human Settlements* (Athens, Athens Center of Ekistics, 1976), pp. 151, 153, 155 and 157).

Doxiadis and the ideal dynapolis: The limitations of planned axial urban growth

Ray Bromley

The author[1] is a Professor in the Department of Geography and Planning at the University at Albany, State University of New York, where he directs the Masters Program in Urban and Regional Planning. He is a member of the World Society for Ekistics (WSE), the American Institute of Certified Planners, the American Planning Association, the International Planning History Society, and many other professional and scholarly associations, and he has served as a consultant with the United Nations, UNICEF, USAID, and various projects funded by the World Bank and AID. His research and publications focus on: the history of ideas in planning and community development; metropolitan and regional development policies; the revitalization of old neighborhoods; disaster avoidance and relief; and, micro-enterprise development. The text that follows is a revised and extended version of a paper presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

Introduction

From the mid-1950s till the mid-1970s, Constantinos A. Doxiadis (1913-1975) was probably the world's leading analyst, designer and promoter of urban development. His firm, Doxiadis Associates, was one of the most active urban development and planning consultants, operating in over 40 countries, and it designed some of the world's largest national housing programs, new city, urban expansion and urban renewal projects. Doxiadis established and promoted ekistics as a new field of study, "the science of human settlements," he co-founded its journal *Ekistics*, and he authored or co-authored over two dozen books and literally hundreds of articles and planning reports. Between 1963 and 1974 he also organized nine international conferences known as the Delos Symposia, involving many of the most creative intellectuals of the era, and he participated in several other major conferences on urbanism and global futures.[2]

From the end of the Second World War in 1945 till his untimely death in 1975, Doxiadis conceived and promoted ekistics as a single, integrated, pure and applied discipline, covering every aspect of the spatial distribution and organization of human activity. Through the work of Doxiadis Associates and two other organizations that he founded, the Athens Technological Organization and the Athens Center for Ekistics, Doxiadis was able to advance a comprehensive program of consultancy, applied research, publications, education, training and conferences in ekistics. This program was reinforced by the involvement of many leading intellectuals in the Delos Symposia, and by the foundation of the World Society for Ekistics in 1965 (BROMLEY, 2003). The rising volume of activity, discussion and publication in the ekistics movement helped build international support and interest for the first United Nations Human Settlements Conference held in Vancouver in 1976, and for the subsequent establishment of the U.N. Habitat Secretariat in Nairobi (SEARLE, 1980).

Ekistics embraces interior design, architecture, landscape architecture, urban design, civil and environmental engineering, planning, geography, and all applied social and environmental fields concerned with activity patterns in space, and with how people use, organize and create spaces. It stretches in scale from the room to the whole world. Unlike sociology, economics and other conventional academic disciplines, where many great minds have contributed a wide variety of different theories and principles, ekistics still consists mainly of Doxiadis' ideas. The merits of ekistics as an integrated field of study often become confused with the theories and principles which Doxiadis developed for the discipline.

During his lifetime, Doxiadis' intellect and energy dominated the field that he had visualized and established. If he had lived to a ripe old age, he might have gradually faded into the background as a senior statesman watching young scholars challenge his theories and develop new ekistic ideas. Instead, the discipline of ekistics is still very closely associated with Doxiadis himself, and with the terminology and theories that he developed. Many of Doxiadis' ideas were very insightful and have stood the test of time, but others are ripe for reconsideration. This article will evaluate one of Doxiadis' most controversial ideas – his axial urban growth (AUG) model, which he often called "the ideal dynapolis."

Doxiadis (1976a, pp. 5 and 32-47) used the prefix "dyna-" to indicate a rapidly growing urban area, differentiated by scale into dynapolis (towns and cities in the 5,000-200,000 range), dynametropolis (in the 200,000-10,000,000 range), and dynamegalopolis (a metropolitan region with over 10,000,000 inhabitants). He saw rapid world population growth and urbanization as pressing global realities, necessitating massive urban expansion and the foundation of new cities for at least 150 years. In numerous writings (e.g. DOXIADIS, 1967), he projected the tremendous growth of the world's population from about three billion in 1960 until its eventual stabilization at a figure between 15 and 50 billion sometime between AD 2100 and 2200. He also predicted that the world's population would shift from one third urban in 1960 to over 97 percent urban after AD 2100.

In Doxiadis' axial urban growth (AUG) model, outward growth from the original city center takes place in only one direction, along a gradually widening linear axis. This growth model is considered "ideal" because it creates a city with unlimited potential for expansion and with minimal needs for re-zoning

and renewal (DOXIADIS, 1966a, pp. 53-72). Expansion is accommodated by extending the main transportation corridors, and by adding new "sectors" along the extended corridors. Each main transportation route is also a utility corridor. Each "sector" is a giant rectangular or square area up to two kilometers long and wide, bounded by major transportation and utility corridors, housing between 20,000 and 60,000 people, and having its main community facilities set in predominantly pedestrian areas towards the center of the area (DOXIADIS, 1963, pp. 106-115) (fig. 1). On a massive scale, Doxiadis' sectors resemble the neighborhood units and superblocks so frequently found in mid-20th century modernist planning (HOUGHTON-

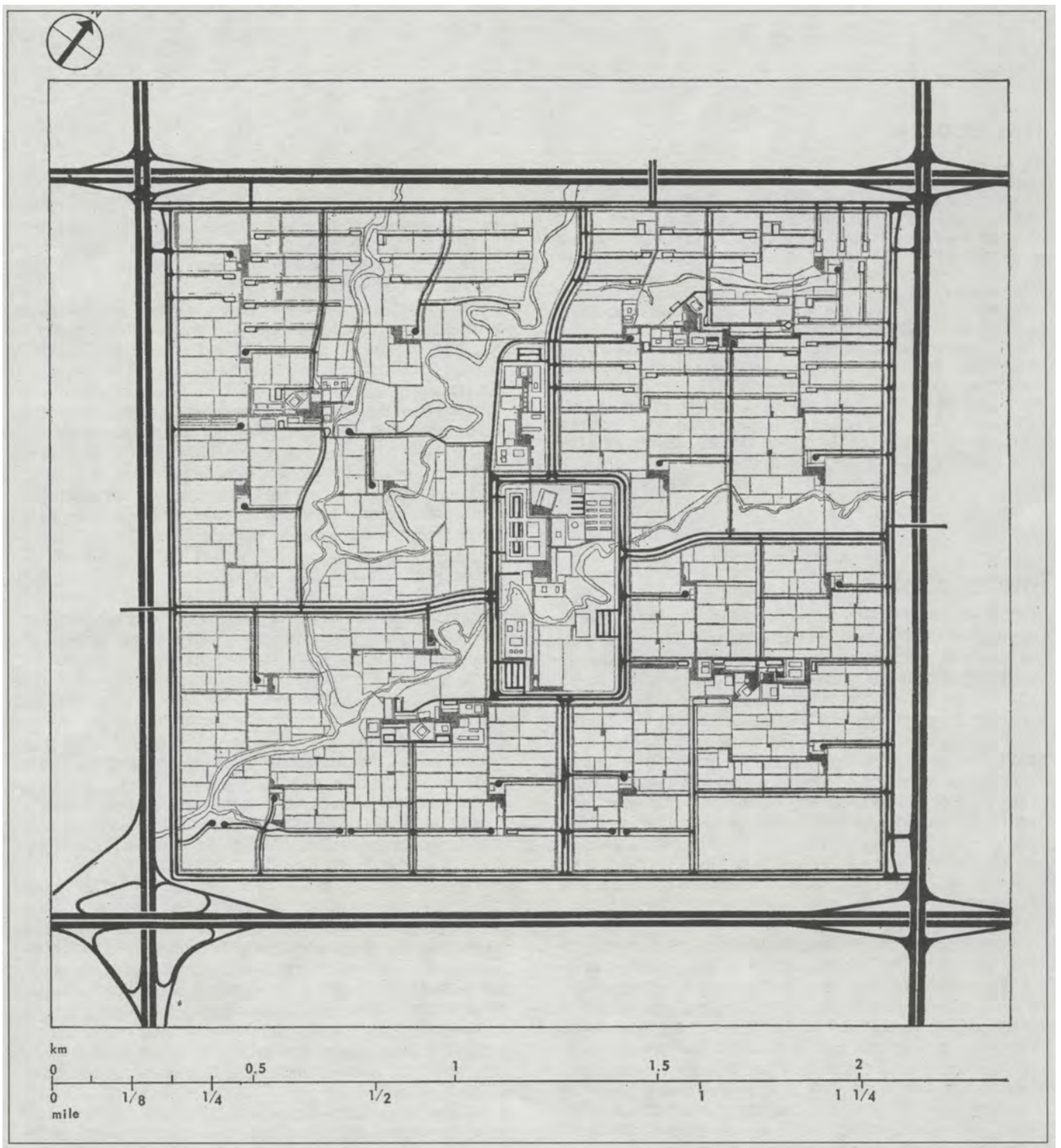


Fig. 1: A complete sector in Islamabad, bounded by transportation corridors and with a pedestrian-dominated institutional and service concentration in the center. (*Source:* Doxiadis, 1968, p. 361).

EVANS, 1975).

Doxiadis described the ideal dynapolis as "a parabolic settlement with uni-directional growth." When he applied the uni-directional growth model to a rapidly-growing metropolitan area including both central city and suburbs (population 200,000-10,000,000), he called it "dynametropolis, the ideal city of the future." He envisaged a group of metropolises, each growing uni-directionally, linking up with one another to form a dynamegalopolis, and eventually fusing to form the great global urban system of the future, which he called Ecumenopolis (DOXIADIS, 1968, pp. 364-380). The AUG model was a key component of Doxiadis' most famous project, the design for Islamabad, the new Capital City of Pakistan, prepared in 1959-1960, and of most of his other new city projects and urban expansion plans.

Ekistics as field of study and channel for Doxiadis' ideas

Doxiadis' main ideas, as applied to ekistics and world development, can be summarized as 15 principles:

1. Human settlements have five elements: Anthropos (people as individuals), Nature, Society, Shells (buildings), and Networks (roads, utilities, transportation, communications and administrative boundaries).
2. Human settlements are organized in a 15-level nested hierarchy of "ekistic units" – man, room, dwelling, dwelling group, small neighborhood, neighborhood, small town, town, large city, metropolis, conurbation, megalopolis, urban region, urban continent, Ecumenopolis. The highest levels of the hierarchy are still in process of formation as functional units.
3. Settlements are rationally organized according to function, technology and scale, into a nested hierarchy of central places.
4. All problems and topics should be analyzed spatially and temporally, and conceptualized, whenever possible, in diagrammatic terms. Analysis is always facilitated by identifying trends and projecting them into the future, and by defining a scale of concern and then seeking to analyze problems at that scale, at the next smaller scale, and at the next larger scale.
5. Economic development, population growth, urbanization, technological progress, and globalization are inexorable forces in the world.
6. Global problems can be overcome by the concentrated effort and focused interaction of the most talented individuals from a wide range of disciplinary backgrounds. It is the task of the ekistician to gather these individuals and to focus them on the problems and potentials of human settlements.
7. The gap between rich and poor, both in specific countries and in the world as a whole, should be narrowed.
8. International organizations are important and must be strengthened, in the hope of eventually creating a world government.
9. National governments need to prepare national urban development strategies and national housing programs so as to accommodate and canalize the inevitable processes of population growth and urbanization.
10. Ekisticians should learn and implement the principles of environmental sustainability, taking advantage of renewable resources whenever possible.
11. Modern cities must be built with grid plans, a hierarchy of transportation and utility corridors, superblocks, and neighborhood units. These principles guarantee high levels of functional efficiency together with "a human scale" at the local level – walkable, livable neighborhoods with public spaces and services to facilitate recreation and social interaction.
12. Cities should be dense and low-rise, with substantial provision of public transportation. Both high-rise development and automobile dependence should be avoided because they create congestion and fail to promote community.
13. Historic settlements and sites should be preserved by canalizing urban development elsewhere. They are vital elements of cultural heritage which help to maintain cultural diversity in the globalizing world.
14. Traditional urban growth is dysfunctional because the core areas of the city must be continually renewed as the periphery expands outwards. Instead of expanding in all directions, cities should expand preferentially in one direction, creating a gradually widening linear city known as the ideal dynapolis or dynametropolis. Such cities, exemplified by Doxiadis' plans for Islamabad in Pakistan and Tema in Ghana, facilitate continuing growth without the need to demolish and rebuild existing areas.
15. World population growth and urbanization are proceeding very rapidly, and will continue for between 125 and 225 years, until a stable globalized situation called Ecumenopolis is attained. Ecumenopolis will be an interconnected global urban network with between 15 and 50 billion inhabitants, embracing almost all the world's population and functioning as a single whole.

This article takes the first 13 principles as given and focuses its attention on principles 14 and 15, the visions of dynametropolis and Ecumenopolis. Principle 14 is the prime focus of analysis, but Doxiadis' graphic vision of Ecumenopolis relies so heavily on the AUG model that principle 15 has to be pulled into the discussion of principle 14. Principle 15, in turn, is based on population projections and technological assumptions made before 1974, the year of publication of Doxiadis' and Papaioannou's highly-speculative work, *Ecumenopolis: The Inevitable City of the Future*. Three decades have lapsed since the publication of *Ecumenopolis*, revealing how prescient the book was in a few areas, for example the emergence of the Internet, and how exaggerated its forecasts were in other areas, notably global population growth, transportation technology, and economic and political integration.

The ideal dynapolis

Doxiadis' vision of "the ideal dynapolis" was developed in the late 1950s as a reaction to the pace of world urbanization and the growth and renewal problems of traditional cities. Doxiadis (1960) assumed that cities and metropolitan regions were normally fast-growing and monocentric, focused on a central business district (CBD), and that they should remain monocentric. He knew of metropolitan areas which were polycentric conurbations, but he did not feel that they represented appropriate growth models. Instead, he idealized and advocated the monocentric metropolis focused on a CBD. Doxiadis recognized that several rapidly-expanding monocentric metropolises in proximity to one another might gradually merge their outer suburbs to form a continuous urban region with more than 20 million inhabitants and several separate CBDs, a phenomenon which he called megalopolis. The megalopolis concept was popularized by Jean Gottmann (1961) in his landmark book on the urbanized northeastern seaboard of the United States, stretching from south of Washington through Baltimore, Philadelphia and New York, to Boston and beyond.

Doxiadis used the prefix "the ideal dyna-" not only to indicate rapidity of growth, but also the capacity to continue growing

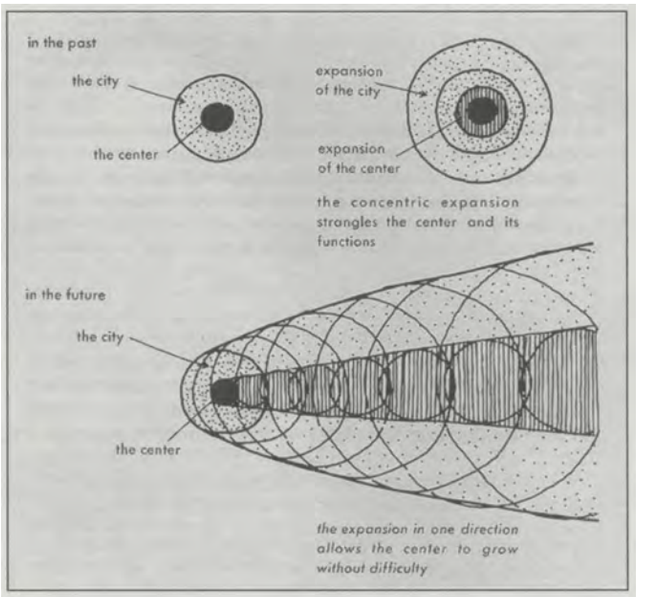


Fig. 2: Justification of the ideal dynapolis. Concentric expansion of settlements is not possible without increasing congestion and destroying inner city neighborhoods. Parabolic expansion of the city in one direction avoids congestion and saves most of the old neighborhoods. (*Source:* Doxiadis, 1966a, p. 56).

rapidly because new land and infrastructure would be made available for ongoing axial urban development. He saw the ideal dynapolis as a way of anticipating and solving the growth problems of expanding monocentric cities. He argued that when a monocentric city grows in all directions, population and traffic densities rise towards the center, transportation routes from the periphery to the CBD have to be expanded to carry additional traffic, and neighborhoods adjacent to the CBD have to be demolished so that the CBD can expand. As a result, the historic core and inner-city residential communities of expanding cities are gradually destroyed as major transportation and urban renewal projects replace the old fabric. Doxiadis' solution was remarkably simple – that the CBD and the whole city should expand in one direction, so that the traditional roughly-circular city is gradually converted to a linear city continuously growing in only one direction by the extension of transportation corridors and the addition of new sectors (fig. 2). This would preserve three-quarters of the old city, while facilitating the dynamic long-term expansion of the new city in one direction. The layout would favor the development and intensive use of mass transit systems along the linear transportation corridors, while creating new sectors as walkable neighborhood units alongside those corridors.

The linear city

The AUG model is a form of transit-oriented development, creating a linear city. The early development of this idea is usually associated with Arturo Soria y Mata (1844-1920), a Spanish intellectual and transit entrepreneur who first proposed linear cities in 1882 (fig. 3). His linear city projects were really streetcar suburbs, narrow transit-oriented developments in close contact with the adjacent countryside. Soria envisioned linking neighboring cities with linear urban developments, and he also wrote about the possibility of building linear cities thousands of kilometers long and linking such major cities as Cadiz and St. Petersburg, or Beijing and Brussels (COLLINS and FLORES, 1968, p. 35). In 1892 he established a corporation to build a linear city, a 55 km-development running around three-quarters of the circumference of Madrid, and he eventually managed to build the first five kilometers of that city as a pilot project (COLLINS, 1959a, pp. 41-44). In 1897 Soria founded the journal *La Ciudad Lineal*, arguably the world's first journal of urbanism, and it continued to be published through till the early 1930s. Soria worked to build an international network of linear city advocates, and his mission was continued in the 1920s and 1930s by the Spanish author Hilarión González del Castillo and the French architect-planner Georges Benoît-Lévy. Benoît-Lévy (1929) developed proposals for both garden and linear cities in the Paris Metropolitan Region and other parts of France. Although built to be separated from Madrid by areas of undeveloped rural land, Soria's pilot linear city has been swallowed up by the expanding metropolis and it is now simply a neighborhood of the city.

In 1910, the American author Edgar Chambless published *Roadtown*, proposing a single two-storey megastructure building with a monorail personal rapid transit system in the basement and a promenade street along the roof, potentially stretching for hundreds of miles, or even across the Continental United States. Chambless (1910) was probably unaware of Soria's work, but in the 1930s and 1940s Le Corbusier (1933/1967, pp. 221-227; 1946, pp. 69-75) embellished both Chambless' and Soria's ideas to produce visions of linear megastructures snaking across the cities of Buenos Aires, Montevideo, São Paulo, Rio de Janeiro and Algiers, and linear urban developments linking all the major cities of Europe into a continuous urban network (fig. 4). Meanwhile, N.A. Miliutin (1930/1974) proposed linear industrial cities in the Soviet Union, the British CIAM Group developed its MARS Plan for parallel north-south linear extensions of the City of London (KORN and SAMUELY, 1942), and Ludwig Hilberseimer (1949, pp. 134-194) made many alternative proposals for linear urban forms. Arthur Korn (1953), George Collins (1959), Jaqueline Tyrwhitt (1963), and William Houghton-Evans (1975) have all developed extended reviews of the linear city theme, and Tyrwhitt and Houghton-Evans both discuss Doxiadis' ideal dynapolis in their review. Houghton-Evans (1975, pp. 131-156) also introduced circuit linear (loop) models for linear cities of finite size, arranged in a circle, oval or figure-of-eight shape. Such ideas were widely discussed among British new town planners in the 1960s and 1970s. They offered the prospect of efficient cities with easy access to open space, but they required the construction of another new city every time that an existing planned city reached its finite target population.

Over the last 120 years there has been a tremendous amount of writing about linear cities, including numerous proposals for new linear towns and linear urban expansions. Nevertheless, very few planned linear cities have ever been built, and this seems to indicate fundamental resistance to linear urban forms. Part of the resistance may be simple conservatism, favoring traditional rounded and rectangular forms, and rejecting the idea that any single designer should determine the growth pattern of an entire city. Another part of the resistance may be skepticism that linear master plans can ever be implemented, and that linear cities can ever attain effective governance. Most importantly of all, however, there is a profound critique expressed in Christopher Alexander's (1966) classic article "A city is not a tree," which argues that planned linear models are fundamentally over-simplified, ignoring the complexity, diversity and constantly changing character of contemporary life.

The paradox of planned linear cities, so often proposed and so little built, is further compounded by the prevalence of spontaneous linear developments along inter-city roads throughout

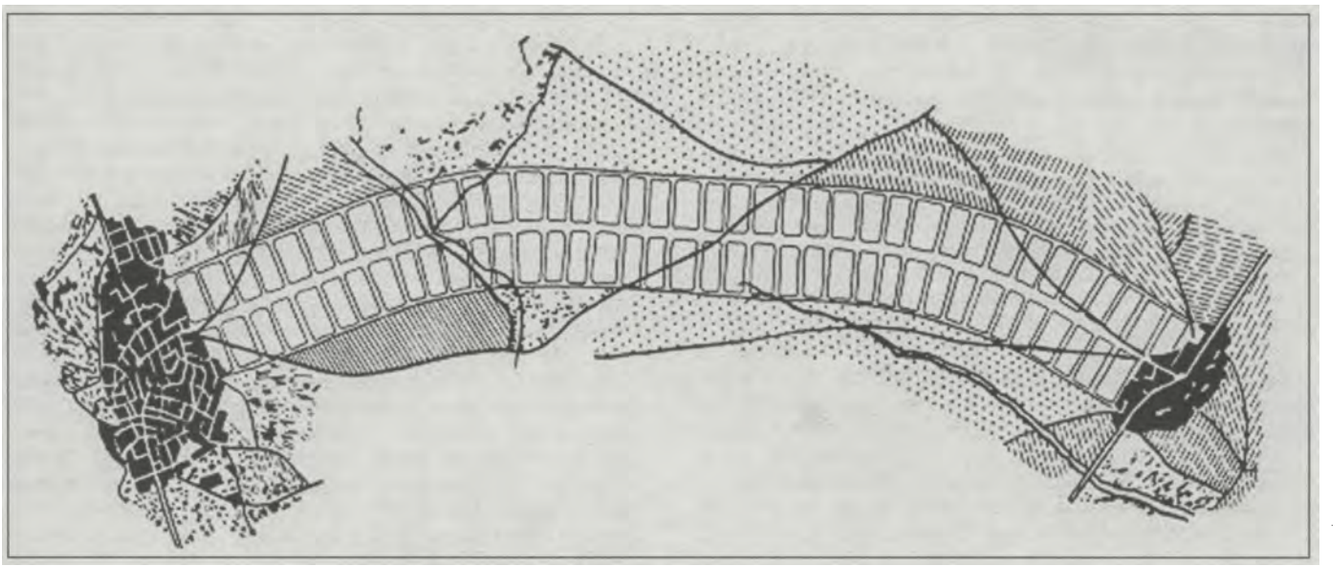


Fig. 3: One of Arturo Soria y Mata's linear city visions prepared around 1911. Parallel rows of residential superblocks are built along a central boulevard with a tramway, linking two existing towns. (*Source:* Boileau, 1959, p. 231).

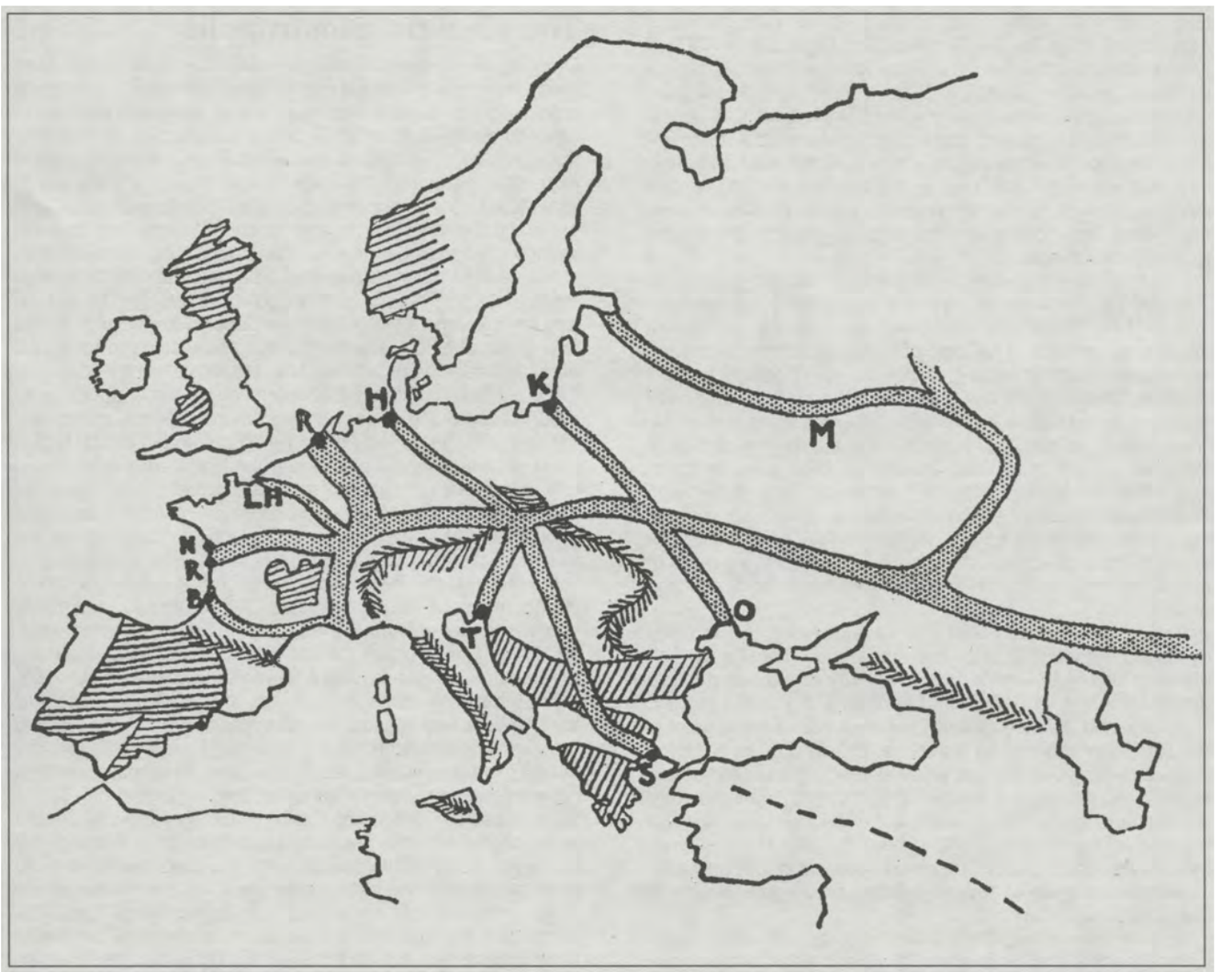


Fig. 4: Le Corbusier and ASCORAL's vision of Europe and its linear "route-cities," prepared around 1942. (*Source:* Le Corbusier, 1946, p. 75).

the world. Most planners and scholars condemn these developments as unsightly, congested, polluted "strips" and "drags" with no sense of aesthetics or community. In his classic *England and the Octopus*, Clough Williams-Ellis (1928, p. 162) poignantly wrote:

> There is surely something rather noble about the broad white concrete ribbons laid in sweeping curves and easy gradients across the country ... But in the buildings that quickly crop up on either hand there is nothing at all noble or satisfying. Whether bungalows or garages, tea-shops or villas, their nastiness is assured. It is this uneconomic "ribbon development" along the main roads that is so rapidly destroying such country amenity as is still left near our growing towns ... The disfiguring little buildings grow up and multiply like nettles along a drain, like lice upon a tape-worm.

In his writings applying the AUG model, Doxiadis chose not to discuss or acknowledge the history of linear city ideas and the related works of other scholars. His version of the linear model had some original elements, and he presented his "ideal dynapolis" as a truly original innovation, uncluttered with alternative visions. Doxiadis proposed to extend the linear city in just one direction, rather than at both ends, he aligned his city along transportation and utility corridors (utilidors), and he had specific design and size recommendations for "sectors" as giant superblocks functioning as neighborhood units. He envisaged "parabolic expansion" – that the city would grow progressively wider as it grew longer. His rejection of radial-concentric street patterns and adoption of zoning, superblocks and linear expansion was similar to Le Corbusier's *Radiant City* model (1933/1967, pp. 141-142). In direct contrast to Le Corbusier, however, Doxiadis (1973) condemned skyscrapers and advocated low-rise development. Doxiadis (1976a, pp. 22-51) also sought to protect some historic areas close to downtown, to preserve open space, and to limit the road and parking requirements of vehicles in the downtown area. Unlike most modernists, he had a very genuine love of historic places and a deep consciousness of the negative impacts of the automobile on human life.

Doxiadis' parabolic vision – the gradually widening linear city – involved a widening of both the center (central business district – CBD – functions) and the predominantly residential areas to either side. The logic of widening seems to be that, with exponential population growth, each year a greater amount of urban development is needed, and the new development focuses around a new and larger focal point at the end of the linear center. In some respects at least, the newest section of the linear center must serve the whole urban area, and with ongoing low-rise development it must occupy a larger area than its predecessors. Doxiadis (1960, p. 38) also presented the gradual widening as a slight concession to growth pressures in other directions, allowing a little sideways growth at the same time as continuing the dominant uni-directional growth.

Doxiadis contrasted the relative simplicity of the ideal dynapolis – a town or small city embarked on sustained uni-directional growth – with the complexity of the polynuclear dynametropolis, where several centers are growing rapidly. He suggested that two or three separate centers can grow in the same direction along parallel axes. In a more complex regional setting like the Great Lakes Megalopolis, he recommended the adoption of a regional grid system, so that settlements, transportation and utilities are all aligned to grow along the axes of the emerging grid system (fig. 5). Thus, a dynametropolis can be "ideal," just like a dynapolis, but only with careful coordination of several different urban growth axes in the metropolitan area.

Though linear cities have not been popular with mainstream urban planners and developers, it is clear that they can work on a modest scale. Success is most likely when the linear city is a new city surrounded by a green belt, or when the linear axis is tightly constrained by topographic barriers, for example a coastal strip hemmed in by mountains. Five, 10, 20, or even 30 km continuous linear urban developments should work quite effectively, facilitating commuter movements along the linear corridor, retaining a clear sense of community and local identity, and facilitating access to coastal, rural and wilderness areas to the sides. Within these scale limits a linear metropolis can be a single municipality, or more probably several municipalities coordinated by some loose form of metropolitan government, including a transit authority. The national government is probably involved in the planning or designation of the linear metropolis, but it does not need to be involved in day-to-day management. If the linear metropolis grows larger, however, all sorts of tensions can emerge. Inter-municipal rivalries and coordination problems grow in significance, and national government intervention may be necessary to impose a new system of metropolitan governance. If the new model is a single linear municipality, replacing formerly separate municipalities, there will be a great deal of resistance. Critics will extol the old local identities and argue that the new linear metropolis fails to create a sense of democratic community. The longer the metropolis, the greater and more complex the problems of internal coordination and external liaisons.

The ideal dynametropolis

Doxiadis presented the ideal dynapolis/dynametropolis idea many hundreds of times in publications, speeches, conference presentations, consultancy reports and real-world plans. He argued that the AUG model is clearly superior to a laissez-faire approach which would allow metropolitan areas to continue expanding gradually in all directions, developing "edge cities" (GARREAU, 1991), sprawling in all directions (LANG, 2003), and gradually changing into polycentric conurbations. He also dismissed the opposite extreme, often discussed in the academic literature but rarely implemented as a national urban development strategy, whereby national governments plan to restructure the settlement hierarchy by expanding many small towns into regional cities, and by founding new cities in rural and peripheral regions (RONDINELLI and RUDDLE, 1978; STÖHR and TAYLOR, 1981). Doxiadis' concern was to direct accelerated urbanization along major transportation corridors, not to perpetuate what he considered to be an outmoded model of discrete, compact central places surrounded by rural areas.

In numerous consultancy reports, Doxiadis (e.g. 1966a, pp. 63-69; 1968, pp. 364-377) prescribed which way individual cities should expand as they were transformed into ideal cities of the future. Copenhagen was to grow south-westward towards Ringsted (fig. 6). Paris was to grow north-westward downstream along the axis of the Seine. Athens was to grow north-eastward, away from the sea. Beirut was to grow east-southeastward across the mountains towards Damascus. Washington DC was to grow southward downstream along the axis of the Potomac. Caracas was to grow south-westward towards Los Teques and Maracay. Accra and Tema were to grow inland, northward and in parallel. Karachi was to grow inland, northeastward. Islamabad and Rawalpindi were to grow westward towards Peshawar, and in parallel (fig. 7). In most cases the determination of which way the city should grow seems to have been totally personal, a decision by Doxiadis based on his perception of the city's needs and the characteristics of the surrounding area. In Islamabad, where government controls are unusually strong and the Capital Development Authority still follows some of the original Master Plan, growth has mainly followed the Doxiadis AUG recommendation (YAKAS, 2001). In all of the other cases around the

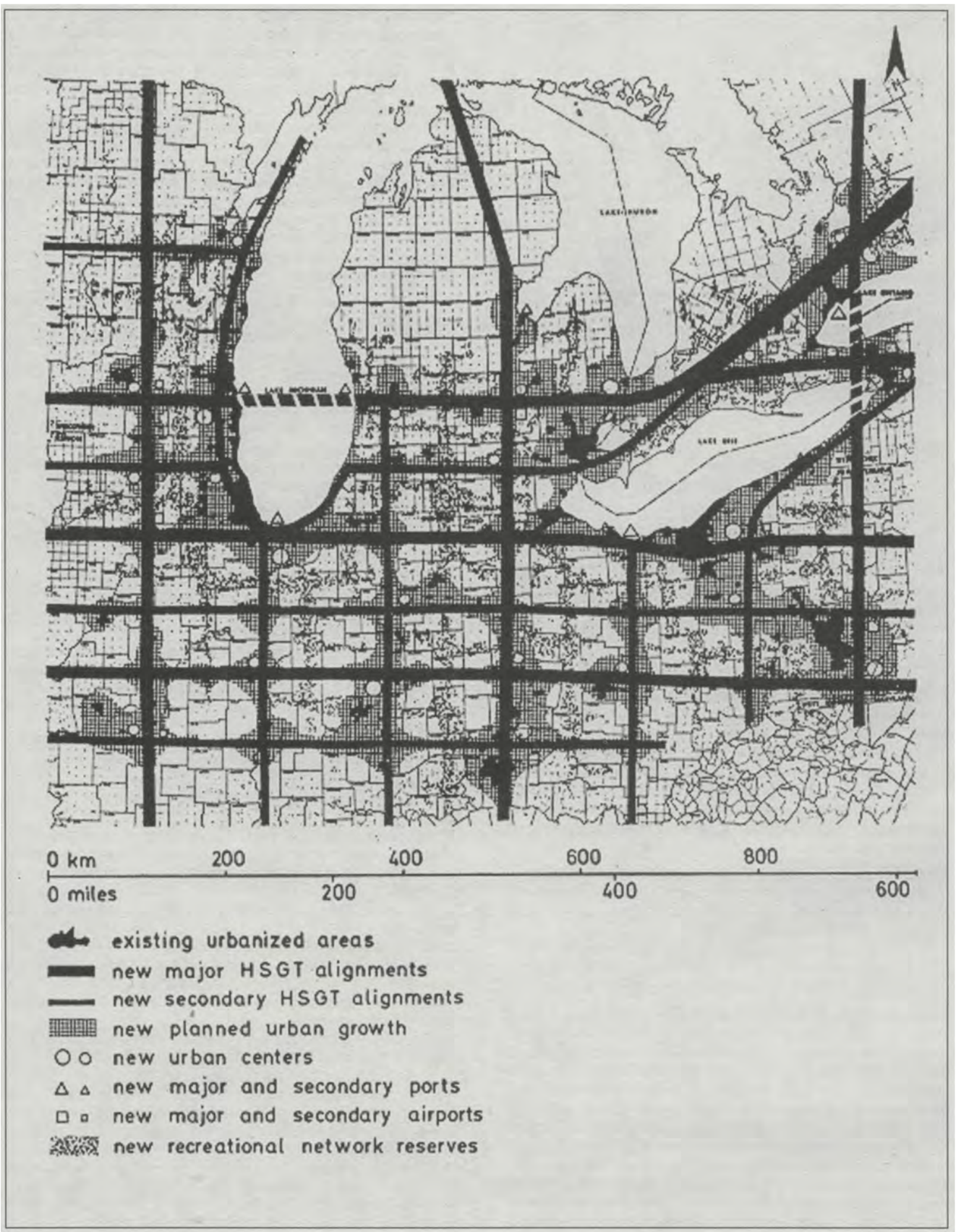


Fig. 5: A schematic presentation of possible organized growth for the emerging Great Lakes Megalopolis. (*Source:* Doxiadis, 1976b, p. 77).

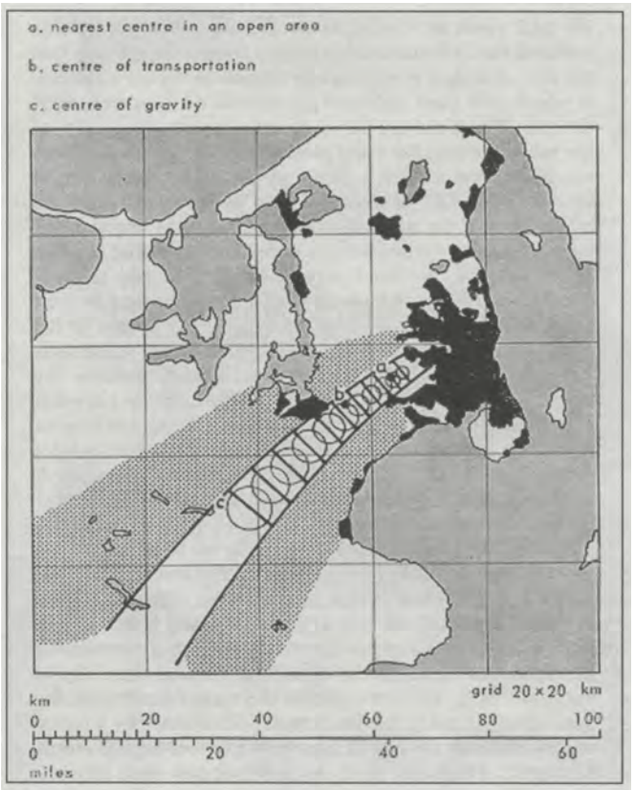


Fig. 6: Proposal for uni-directional growth of Copenhagen. (*Source:* Doxiadis, 1968, p. 473).

world, however, even including Islamabad's sister city of Rawalpindi, growth since the 1960s has been in all directions, with no special priority to the direction prescribed by Doxiadis. It is much easier to prescribe which way a city should grow than to ensure that the prescription is followed!

Doxiadis was generally vague on how the ideal dynapolis could be planned and implemented, and particularly on how to select the right direction for axial growth. He seemed to rely on two assumptions:

- first, that he could convince opinion-leaders, business executives and senior government officials that his model and prescribed direction for axial growth was the right pattern for long-term urban development; and,
- second, that the greatest intellectuals could be similarly convinced and also persuaded to apply the power of their disciplines to find ways to implement the prescriptions.

He built on these assumptions at the Delos Symposia, inviting such corporate and governmental luminaries as Herman Kahn, the renowned futurologist, McGeorge Bundy, adviser to the U.S. Kennedy and Johnson administrations and subsequently President of the Ford Foundation, and Walker Cisler, Chief Executive Officer of the Detroit Edison Corporation. He also invited such leading scholars as anthropologist Margaret Mead, sociologist Suzanne Keller, economist Barbara Ward, political scientist Karl Deutsch, historian Arnold Toynbee, public administrator Lyle Fitch, architect and inventor Buckminster Fuller, and communication visionary Marshall McLuhan. For Doxiadis, Delos was not only a social and scholarly gathering, but also a model of how leading experts in different disciplines could work together to analyze common problems. Characteristically, he posed the big questions and asked his assembled experts to come up with ideas. Thus, for example, at one Delos Symposion, Colin Buchanan, transportation planner, and C.H. Waddington, embryologist and geneticist, were asked to compare blood and traffic circulation and to come up with ideas to facilitate flows.[3]

Planning for the ideal dynapolis is necessarily top-down and regional or national. Existing municipalities might be allowed to continue as local governments, but strong coordination and legal mandates would be required. The decentralized Tiebout (1956) model of inter-municipal competition would have to be replaced with a highly centralized AUG model which assigns municipal functions and requires close coordination. For the AUG model to be applied, planning would need to have the following characteristics:

- A highly-educated and impartial corps of professional planners, architects, engineers and lawyers, working in the public interest, will determine the future pattern of urban development and supervise the subdivision of land and the installation of infrastructure networks.
- All infrastructure easements should be dimensioned to accommodate the future flows of a continuous global urban network, rather than just the immediate needs of the actual population. Major transportation corridors should be wide and straight, and should carry the trunk power lines, water mains, sewers and communication cables.
- No urban development should take place in areas not authorized for development and not provided with infrastructure. All landowners and real estate developers should know which areas are prescribed for urban development, and which are not to be developed. Urban expansion plans must have legal approval, and strict penalties must be approved and enforced so as to ensure that no urban development takes place outside authorized areas.
- Powers of eminent domain and strong anti-corruption policies will be needed to ensure that landowners along the urban growth axis do not speculatively raise land prices to take advantage of the fact that the growth axis must pass over their property.
- Real property taxes will need to be reassessed so as to take account of the increase in value of properties along the growth axis, and the reduction in value of properties in areas where urban development was anticipated but will not now take place.
- A tax increment financing (TIF) system might be instituted so that the increase in property tax revenues along the growth axis can be used to fund infrastructural improvements along the axis.
- Bi- and tri-lateral coordinating commissions of professional planners should determine how best to interlock urban growth axes across national boundaries until the eventual world federation or government is able to supersede them and exercise true global planning. International standards are needed to facilitate the interlinking of infrastructure systems along the emerging growth axes.
- Planners will need to have the confidence that regional and national authorities, and eventually world authorities, will back their decisions on the linear expansion of cities and the formation of growth axes. In some cases the growth axes will cross sacred areas, historic areas, delicate ecosystems, and personal, ethnic and religious territories, and opposition will have to be over-ruled.
- Decisions will have to be taken on the rights of landowners and municipalities just beyond the current metropolitan periphery. Under traditional models of urban expansion, they were preparing themselves for suburban development. Do landowners deserve compensation because their expectations to sell for urban development are now permanently frustrated?

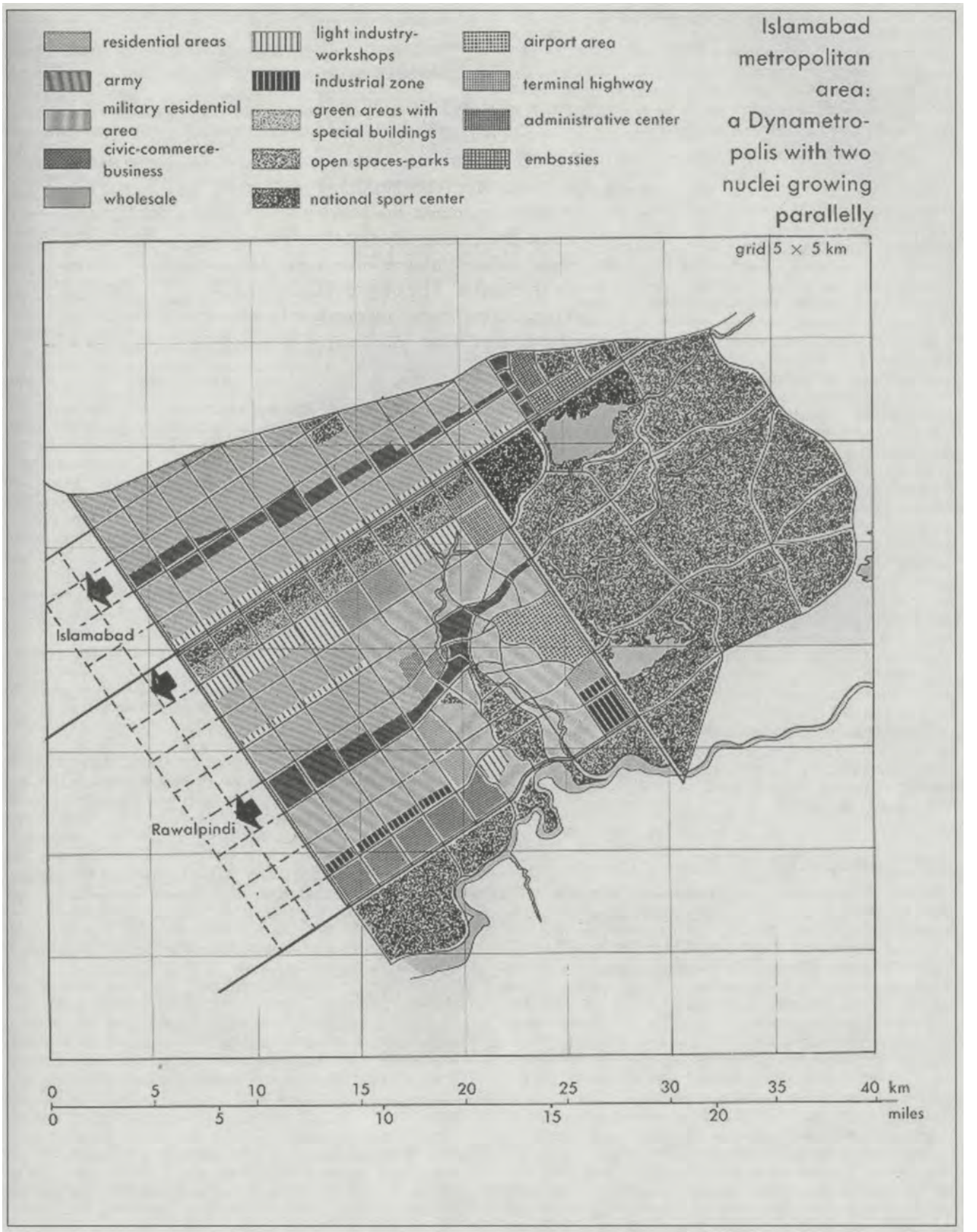


Fig. 7: Proposal for parallel uni-directional growth of Islamabad, Rawalpindi, and the linear park and institutional area which separates the two cities. (*Source:* Doxiadis, 1966a, p. 63).

How can municipalities which had planned for increased services and tax revenues, and perhaps installed additional infrastructure in anticipation of additional growth, be persuaded to accept no growth?

- Future governments will need to respect and follow the growth axes and international agreements adopted by their predecessors, so as to ensure continuity in policy.

To say the least, the planning system necessary for an ideal dynapolis seems difficult to establish. Many questions arise about the fallibility of experts and the potential abuses of central power. As scale is increased from dynapolis to dynametropolis, these concerns are intensified. The planning requirements for an ideal dynametropolis that exceeds 100 km in length presupposes a system of politics, public administration and international relations which does not currently exist anywhere in the world. Achieving the most appropriate model of urban development becomes a prime objective of governments at all levels, and there must be general agreement on the model. Deciding the orientation and design of the growth axes should be left to professional experts, and governments must commit themselves to long-term implementation of the recommended urban development policies.

The problems of urban identity and democratic citizen participation in urban governance multiply as the dynametropolis extends in length, stretching from Paris to Lyon and Marseille for example. These problems are further complicated when the urban growth axis crosses national frontiers, as would occur, for example, from Marseille westward to Barcelona and eastward to Genoa. Local and regional governments must willingly cede many of their current powers to national government, and national governments, in turn, must willingly cede many of their powers and revenues to some form of supranational government or federation which ensures the smooth running of international dynametropolises. The general public and their political representatives will lose any roles they previously played in decisions on urban and regional development policy. Ekisticians could develop all the long-term strategies for urban growth and governance, but in such a centralized power system there is always a danger that the ekisticians will be marginalized by authoritarian politicians or military rulers. Even if the ekisticians do take all the important decisions, is it realistic to assume that they will agree with one another and take the right decisions?

Ecumenopolis

Doxiadis envisaged the ideal dynametropolis as a building block towards Ecumenopolis, "the inevitable global city of the future." To form Ecumenopolis, numerous metropolises must grow and interlink in a coordinated fashion, crossing existing national borders. Planning for Ecumenopolis will be just as top-down as planning for dynametropolis, but it will be more complex, requiring coordination between neighboring national governments and simultaneous coordination with the emerging world government or federation. Most of the urban growth in Ecumenopolis will be linear development along existing coastlines, river valleys, road and rail axes, and the task of the planner will be to keep the transportation and utility corridors open, to coordinate the installation of infrastructure, and to organize urban development in sectors grouped around transportation nodes and strung along the transportation corridors. Doxiadis saw the task of the late 20th century and early 21st century regional and national planners as being to canalize the growth of each city in one direction, coordinating and linking different growth axes to create a dynametropolis, and linking different dynametropolises into a dynamegalopolis. In turn, he saw the task of late 21st and 22nd century planners as being to direct the interlinking of dynamegalopolises into global urban networks (fig. 8).

In their highly speculative work, the 469-page *Ecumenopolis,* Doxiadis and Papaioannou (1974) wrote that:

> Ecumenopolis will come into being, binding together all the habitable areas of the globe as one interconnected network of settlements operating as one functional unit ... We selected and calculated three ultimate ceilings for the population ... 20, 35 and 50 billion people respectively. (p. 247) ... We feel that the most likely figures are those produced by model F-20; ... the point when Ecumenopolis begins will be reached by the year 2100 when there will be a world population of 20 billion. (p. 252) ... The beginning of Ecumenopolis could actually take place at any time between 2100 and 2200. (p. 339) ... In Ecumenopolis only 2.5 percent of the total land surface of the globe will be built up. (p. 344) ... The population of the world ... may not necessarily become one state, but it must become some kind of a federation of equal people. (p. 344) ... A real Ecumenopolis will need a unified global government of some sort. (p. 388) ... We (ekisticians) must use a rational and scientific approach, making a careful study of the complex systems of life in which we live ... Without knowledge, we are relying on blind chance, and it is not right to play games with the future of mankind. (p. 397)

Maps of Ecumenopolis are published in many different books, articles and reports, some for 20 billion people, others for 50 billion.[4] They vary significantly, but all have a similar pattern of population distribution across the world (fig. 9). Population is concentrated in existing cities and metropolitan areas and along linear axes connecting those cities and metropolitan areas. Thus, for example, Lima on the Pacific Coast of Peru becomes connected by a continuous urban corridor to Recife on the coast of north-eastern Brazil, and the corridor runs through Pucallpa to Iquitos, down the Amazon to Manaos, Santarém and Belém, and then along the coast to Fortaleza and Recife. Similarly St. Petersburg and Vladivostok are connected by an urban corridor which runs through Moscow and Sverdlovsk, and along the axis of the Trans-Siberian Railway through Omsk, Novosibirsk, Krasnoyarsk and Kabarovsk to Vladivostok. All versions include a continuous urban axis from Cairo to Cape Town, and the versions envisaging a world population of 50 billion in the year 2200 envisage a continuous linear city running across the Sahara from Tunis to Lagos. The world pattern approximates a grid of west-east and north-south populated axes, overlaid on the global land areas at latitudes between roughly 65 degrees north and 40 degrees south (DOXIADIS and PAPAIOANNOU 1974, pp. 374-381). It is easiest to envisage the transportation corridors as combined superhighways, high-speed long-distance rail and lower-speed commuter rail running along the earth's surface, with residential sectors on either side. Doxiadis (1966b, pp. 76-77), however, recommended "deepways ... underground tunnels ... the higher the speed, the deeper they will go ... For major distances of thousands of miles, they will rely on rockets which will take off and land in tunnels."

The 250-year transition from the 1950s, when the world had less than three billion people, to an Ecumenopolis of 20, 35 or 50 billion people in the year 2200 requires massive population growth and urbanization, and the movement of most rural peoples towards the expanding cities and axes of urban development. It also requires a great deal of coordination to create continuous urban axes from Lima to Recife, from Tunis to Lagos, etc. Each city along the linear axis must grow in the right direction to foster the long-term development of the axis. For Tunis and Lagos to join, for example, a transportation corridor must be established through Tunisia, Libya, Algeria, Niger and Nigeria. All the North African cities on and near the coast from Casablanca to Alexandria, with the exception of Tunis, should grow along the coast to create a continuous urban axis. Tunis, however, should grow southward across the Sahara. Lagos should grow north-northeastward to merge

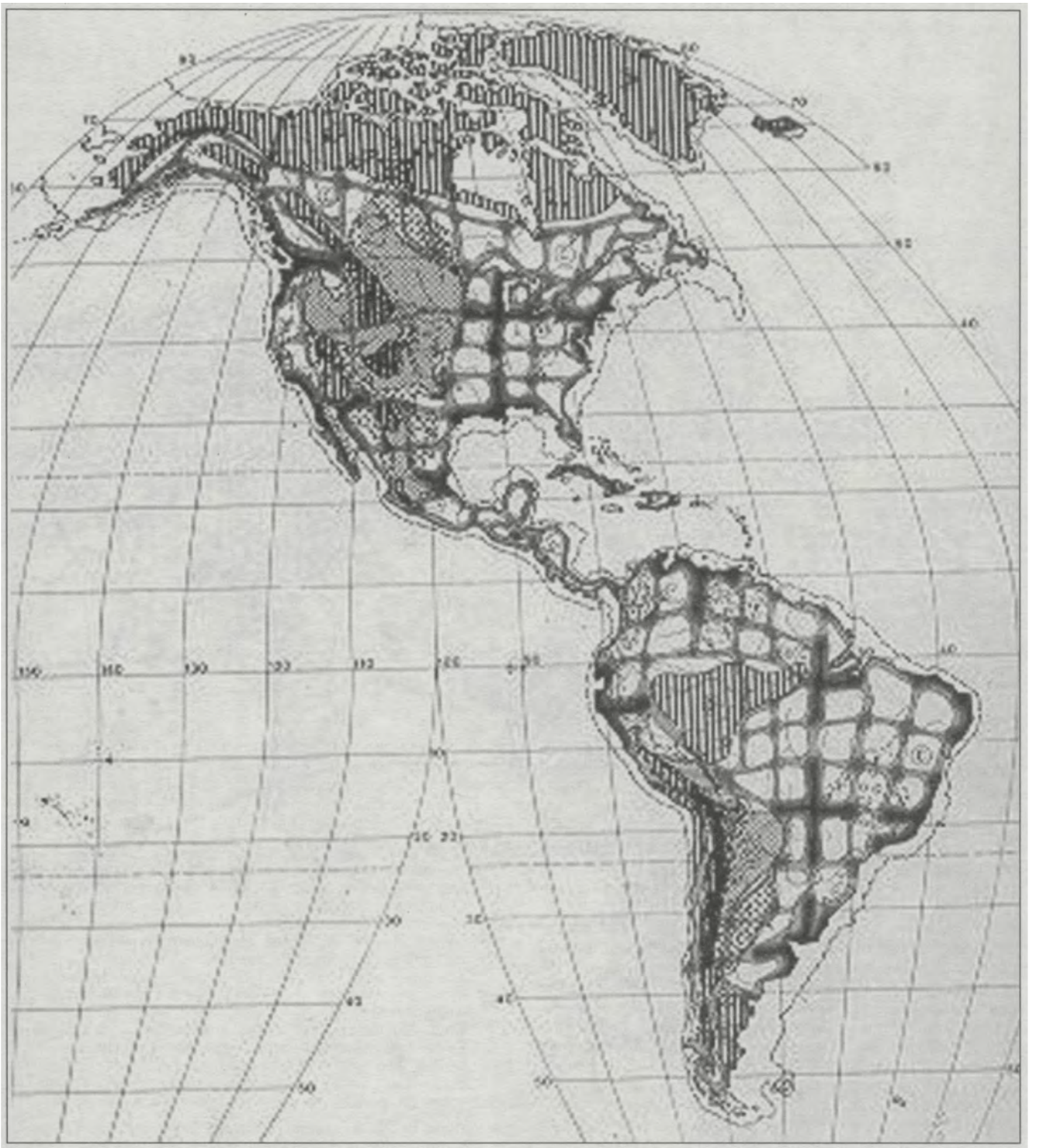


Fig. 8: Theoretical configuration of global axes and centers for the Western Hemisphere portion of Ecumenopolis. The grid-like lines in North and South America are projected axes of urban development. The shaded and stippled areas are zones where extreme cold, heat or elevation, or freshwater scarcity limit intensive urban development. (*Source:* Doxiadis and Papaioannou, 1974, p. 380).

with Ibadan, Kaduna and Kano, and then directly northward to meet the southward-expansion of Tunis. There should be no expansion southward of Algiers, or directly northward from Lagos towards Algiers. Thus, each city has a prescribed direction of expansion to facilitate the development and efficient functioning of Ecumenopolis. Lack of coordination would lead to disconnected urban spurs, for example a 1,000 km southward expansion of Algiers which does not link with anywhere in West Africa because no West African metropolis expanded northward to meet that spur.

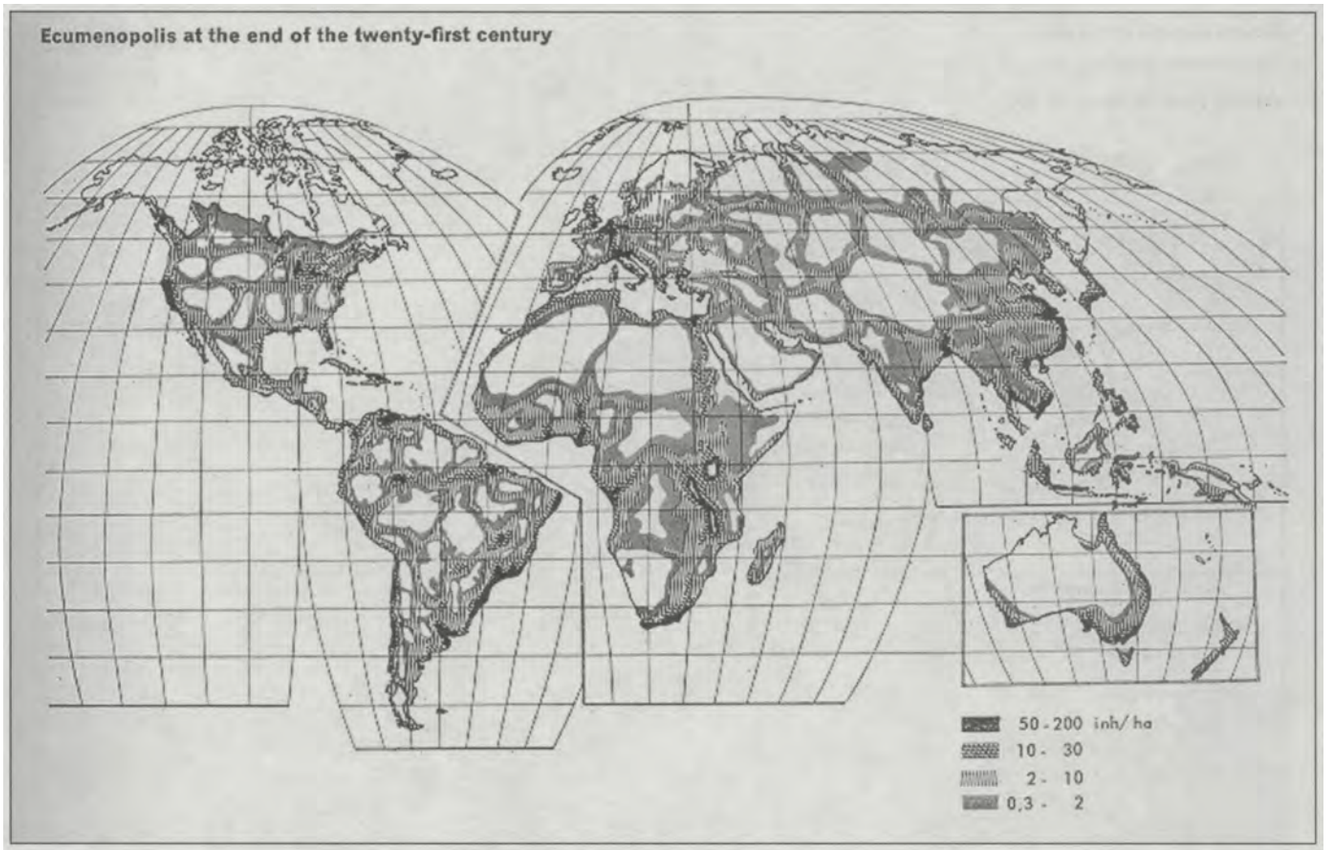


Fig. 9: Ecumenopolis at the end of the 21st century. (*Source:* Doxiadis, 1968, p. 377).

Doxiadis and Papaioannou (1974) suggest that Ecumenopolis will rely mainly on nuclear power (p. 209), sophisticated computer and communications technologies (p. 333), and interlinked transportation, utility and communication networks, which might be termed "coordinets." (p. 333) They assert that "Anthropos' only long-term hope is to establish a genuine partnership with Nature; his destiny is inextricably linked with that of the biosphere, that fragile and infinitely complex living system which forms the organic skin of the planet." (p. 340) In ecological terms, however, the idea of the world's land surface being segmented into discrete rural and wilderness areas by continuous networked axes of urban development is very troubling. Natural habitats would be broken up, interrupting the migration patterns of animals and the reproduction of plants, causing many plant and animal species to become extinct, and reducing biodiversity. Drainage and flooding patterns could also be dramatically altered and prime farmland would be lost, notably along major rivers such as the Amazon and Nile, and along many coastlines.

With three decades of hindsight, Doxiadis' and Papaioannou's vision of Ecumenopolis seems far-fetched. World population growth has fallen, it is difficult to imagine how growth rates and energy technologies could facilitate even 15 billion people living in harmony with the biosphere, and "a world federation of equal people" seems increasingly remote. Some of their specific prognoses seem absurd, for example that: "The goal will eventually be reached when Anthropos can travel within the whole of Ecumenopolis in 40 to 50 minutes, traveling through tunnels or maybe a satellite for the longest distances between primary centers at 20,000 km (12,400 miles) per hour." (p. 349)

While the speed of travel within Ecumenopolis was predicted with spurious precision, Doxiadis and Papaioannou were extraordinarily vague about the socio-political changes which would have to take place to facilitate the development of Ecumenopolis. Statements were couched in very general terms. In Chapter 43, entitled "The Big Questions," for example, the authors wrote (pp. 392-393):

> An enormous number of questions remain to be answered before we can be certain about the future and certain about a successful Ecumenopolis, too many by far for us to deal with here. Anthropos must answer all these questions gradually and in a wise and successful way if he is to achieve that future which we know it is possible for him to achieve ... Despite his present screaming and crying Anthropos does know what he wants – higher incomes and improved technology ... We are attempting to realize dreams of world unification without knowing how to do so, nor how to save what Anthropos has created during his long history ... Ecumenization inevitably is the next phase for Anthropos. It will give him the opportunity to take the next big step forward in his evolution, but it will also make it possible for him to destroy himself completely unless he opens his eyes to what is taking place.

Writing in 2003, almost 30 years after the publication of *Ecumenopolis*, it is obvious that Doxiadis and Papaioannou (1974) over-estimated the world's population growth and eventual demographic peak. They correctly foresaw ongoing economic and cultural globalization, and the significance of new communications technologies. From the viewpoint of ekistics, however, their most obvious weakness was their conception of the urban form of Ecumenopolis. Just as the economies and societies of Los Angeles and Tokyo can be closely interlinked through telecommunication, the Internet and the aeroplane, without any physical urban bridge across the Pacific, the economies and societies of Paris, Berlin and Moscow can be

closely interlinked without axial urban growth between the three. Transportation corridors for road and rail do not need to be urban corridors, and most personal and business communication will be through advanced telecommunications, including the Internet, and by air. The overland transportation corridors that unite Moscow and Vladivostok, or Cairo and Cape Town, serve for many local overland passenger and freight connections, and for some long-distance heavy freight connections, but they do not form a useful basis for urban development. The safety, efficiency and aesthetic quality of these corridors may be enhanced by their being "townless highways" rather than linear cities (MacKAYE and MUMFORD, 1931). If Doxiadis' far-fetched vision of deepways and rocket transportation becomes a reality, it is even harder to imagine why settlement should be extended along the earth's surface above the deepway tunnels and below the lines of rocket flight. High speed vehicles travel from point to point, and it is only at specific points that people can board or disembark.

A form of Ecumenopolis may well come into existence sometime in the future, but there is no good reason for it to be a physical grid of linear cities stretched across the world's land surface. Instead, it will be a galaxy of metropolitan regions, tightly interconnected by transportation and telecommunications, but not physically united by linear urban axes. A continuous linear city from Tunis across the Sahara to Lagos is unappealing in every sense – socially, culturally, politically, aesthetically and, above all, environmentally.

Conclusion

When magnified to immense proportions and linked to visions of Ecumenopolis, the AUG model has no merits. It appears as nothing more than an eccentric spatial vision. It is easy to understand why Doxiadis proposed the model to provoke thought and discussion, but it is difficult to take it seriously as an ideal urban form.

When limited to a much more local scale – perhaps with a maximum length of 50 km – the application of the AUG model to create the ideal dynapolis and ideal dynametropolis is at least a possibility. It can form the basis for a new linear city, built in a sparsely populated region, and it may be an appropriate urban development model for some transportation corridors with substantial topographic barriers on both sides. In most cases, however, it is just one of many alternative growth patterns, and it is unlikely to be selected unless it is imposed by a higher level of government and backed by strong legal powers. It works against the conventional logics of market forces and democratic decision making, imposing a very strong set of planning controls to channel urban development in one direction and to prevent developments in other directions.

The original justification for the ideal dynapolis focused on the preservation of historic downtown and inner city neighborhoods, and the maintenance of a monocentric metropolitan form. The ideal dynapolis model converted the CBD from roughly circular to linear in form, and it limited the demolition of traditional neighborhoods to one quarter or less of the total. Nowhere in the world, however, has this model been followed as a deliberate strategy of urban renewal combined with historic preservation. The model requires strong central powers and long-term continuity in planning and implementation. It also ignores many of the alternatives which have emerged in cities around the world. In reality, all major metropolises are now polycentric, with one or more downtown business areas, several neighborhood centers and commercial strips, and some development of drive-in retailing near the edge of the metropolitan area. The old downtown may be preserved, but gradually converted from general retailing to speciality retailing, perhaps focusing on heritage tourism. Many cities have some degree of axial growth, and so downtown may gradually expand in one direction and shift its center of gravity in the process, but the axial development of downtown does not preclude urban expansions in other directions, especially on the metropolitan periphery. As cities grow, old structures may be adaptively re-used for new purposes, and old neighborhoods may be revitalized as gentrified historic areas or densified as rental slums. The variety of urban development rates and forms around the world is so diverse and rapidly-changing that it is difficult to imagine how a brilliant ekistician could come to any city, determine the pattern of long-term urban development, and then persuade the local business and political leaders to change all the laws to enforce that development model. It is even more difficult to imagine how future generations would agree to conform to the visions of their predecessors. Real-world politics, urban development and technological change are messy, but fascinating subjects for ekistic analysis. The long-term future is well worth discussing, but contemporary ekisticians should not delude themselves that they can predict enough to establish models of urban form which should be implemented for a century or more. Ekistics does not need the AUG model or any specific physical vision of Ecumenopolis in order to justify its existence as a field of study and professional practice.

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Notes

1. The author can be contacted at «r.bromley@albany.edu».
2. The Delos Symposia from 1963 till 1975 are all extensively reported in *Ekistics*. The 1975 Symposion was held shortly after Doxiadis' death and served as a memorial and tribute to his life and work. In 1973 there was no Delos Symposion, but Doxiadis organized a smaller event called the City for Human Development Symposion (*Ekistics*, vol. 35, no. 209, April 1973). Examples of other major conferences and volumes which served as springboards for Doxiadis' ideas include the Mayo Centennial Symposium (Doxiadis, 1965), Arnold Toynbee's (1967) *Cities of Destiny*, David Lewis' (1968) *Urban Structure*, and the Fourteenth Nobel Symposium, held in Stockholm in September 1969 (Tiselius and Nilsson, eds., 1970).
3. The author is indebted to Panayis Psomopoulos for this example.
4. See, e.g. Doxiadis (1968, p. 377; 1972, pp. 56-57); Doxiadis and Papaioannou (1974, pp. 38-39 and pp. 360-363).

Acknowledgement

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Urban and rural areas as defined by population density in Japan

Haruhiko Goto

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Introduction

Agrarian and industrial revolutions were two major turning points in the history of humankind. And the revolutionary change in information technology taking place today is indicated as the third turning point. Based on this understanding, the study presented in this paper reviews the formation of cities and rural districts in Japan. Population density and life expectancy are examined as the parameters for collective living (fig. 1).

Eve of agricultural revolution

Considering the late Stone Age of hunting societies, the population density of mammals could be deducted from their weight, hence it is possible to estimate the human population density at that time to have been 1.4 persons per square kilometer, and the life expectancy to have been 26.3 years. Results of recent studies in ancient history show that the population density in the Jomon period (Japanese hunting era) approximately corresponds to this estimate. Before 400 BC (Jomon era), the population density was 1.3 persons per square kilometer and the life expectancy was 31 years. This was an appropriate density for humans to live as a part of nature. The density is also considered as fundamental for population allocation for the future sustenance of land.

The agricultural revolution was the determining factor for humankind to settle down. The spread of rice cultivation that induced a population explosion demonstrates this effect.

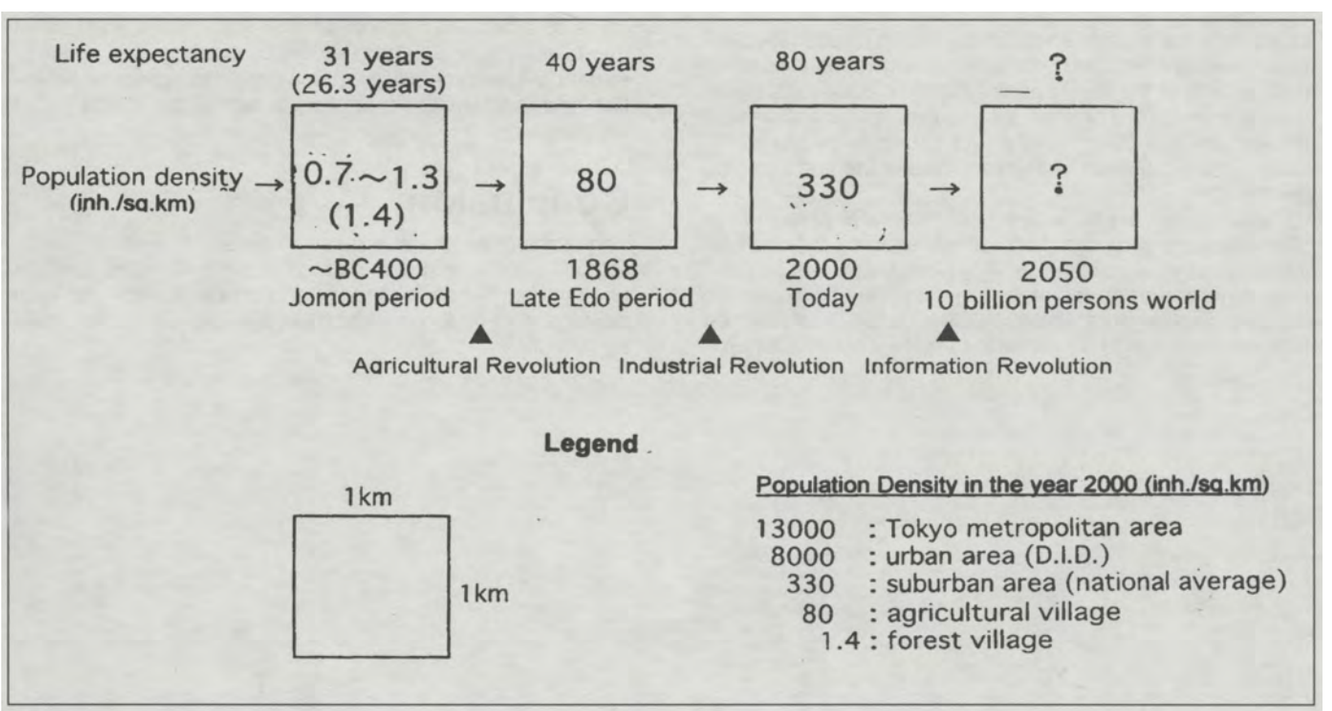

Fig. 1: Change of population density and life expectancy in Japan, 400 BC to AD 2050.

Urbanization and development of rural communities – Twin phenomena

Communities formed by settlement were in principle self-sufficient. However, cities emerged as power centers governing agricultural production or the distribution of agricultural products, a fact that forced communities in the periphery of cities to expand agricultural production. These communities under the control of cities became internalized as rural districts, which were subject to the governing power of these cities, and were given no choice but to emphasize their characters as the supplier of food, energy and labor for the cities.

In other words, the rise of cities led to the creation of rural communities. It is possible to perceive urbanization and development of urban areas as twin phenomena that develop in tandem. In the early stages of development of cities and rural communities, transport and information networks were underdeveloped; especially in the ancient period, when the elite class governed the cities and controlled the rural villages, it was comparatively easy to distinguish cities and rural communities. In medieval times, feudalism in the form of lord and vassal relationship based on provision of land became common, and the system formed the foundation of society and nation.

The closed system of cities and rural communities, self-sufficient within the district, realized by the agricultural revolution, reached its peak on the eve of the industrial revolution. Thus in Japan, city development using human power and the small help of power from livestock such as cattle and horses, and the new rice field development to supply the maximum food and energy to the cities, reached its peak in the late Edo period. As a result, the population density of Japan reached 80 persons/sq.km and the average life expectancy extended to around 40 years. These increases could be attributed to the civilization advanced by the agrarian revolution.

The industrial revolution – Advent of the era of modern urban development

Baptized by the industrial revolution, Japan entered the period of building cities that consume an enormous amount of fossil energy in the Meiji period. Gigantic communities became the center of politics, economies and culture were formed, and the 20th century was known to be the era of cities. The population of Japan tripled in the last hundred years.

Today, Japan depends for approximately 90 percent of its total energy consumption on fossil fuel sources such as coal and oil. In other words, the life of the cities and rural communities of Japan depends on energy supplied from outside sources. Furthermore, the population density has reached 340 persons per square kilometer for the whole of Japan – and as high as 12,800 persons in the 23 wards area of Tokyo – while life expectancy has leapt from 50 years in the pre-war period to 80 years at present. This longevity enjoyed by society is the product of advancement in civilization. In other words, each citizen now lives an inflated life span in which six extra months are given for each year of life, compared to their ancestors.

The urbanization process in Japan has now reached its final stage, and cities nationwide have expanded their range to the maximum. An urban lifestyle prevails: the majority of households depend on wage income and it is becoming difficult to distinguish between the city and the rural community by living conditions.

Issues of central cities and mountainous regions – Twin phenomena

In the past, food, energy and labor were supplied from the rural communities to cities. It was a one-way relationship comparable to the river flowing from upstream (production) to downstream (consumption). However, with the development of capitalism and the expansion of the global society and economy, the relationship of cities and rural communities is becoming global in its expanse. That is to say that Japan – the information city nation – is founded on rural communities corresponding to the villages witnessed in other countries of South East Asia, which, particularly in the case of Japan, is an extremely fragile formation. In the international perspective, Japanese rural districts can be considered to be in the downstream also. This indicates that the foreign rural communities are in the upstream, meaning that the rural region in Japan no longer serves the role of rural communities. Part of such rural communities will become incorporated into the cities, while the majority will face the problems of mountainous regions, such as depopulation for example.

On the other hand when the approximate city to rural population ratio of 8:2 becomes constant, the urbanization of the cities of Japan will come to an end. In addition, the flow of goods, money and people into the central cities in the downstream will become stagnant, lowering the economic potential, and the central city areas will encounter a new set of problems.

Conclusion

The problems of the central city area and the mountainous regions are the vestiges of the 20th century. They are twin phenomena that symbolize the end of urbanization and rural development in Japan, which will be a considerable structural issue.

Sustainable development, international cooperation and local authorities

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The need and the concepts

Cities play an important role in meeting the goals of sustainable development. Worldwide, city-based producers and consumers account for most of the renewable and non-renewable resource consumption and waste generation as noted in the Brundtland Report. Meeting the current needs of urban populations should not acquire the dimensions to constitute a threat to sustainability of development.[1] Therefore, the priority actions have to be centered on reducing both wastes on the global environment. Such initiatives may include reducing fossil fuel consumption through energy conservation, more efficient transportation systems, and reducing the amount of waste through pollution prevention.[2] There is no doubt that these longer term ecological concerns are relevant to all cities in the way of development, for as they grow and prosper, their consumption of resources and generation of wastes will rise accordingly unless action is taken now to promote the efficient use of resources and the minimization of wastes.

Sustainable urban development, sustainable urbanization and sustainable cities have become the concepts used frequently in the literature especially during the 1990s. It is assumed that sustainable development can be realized only when master planning is directed to minimize total needs, to promote public transportation, to conserve fertile agricultural land, to avoid wasting other sensitive ecological resources, and to enhance energy saving in building designs and layouts. This would certainly require carrying out sustainability in city planning processes through regional resource inventories, vertical and horizontal coordination among all public authorities and private entities involved in regional resource management and development of renewable resource strategies. In other words, sustainable urban development may be understood as the maximization of the efficiency in the use of resources, maintaining natural resource stocks at or above their present level, social equity in the distribution of development costs and benefits and the avoidance of unnecessary foreclosure of future development options.

According to a definition of the Economic Commission for Europe (ECE), the ideal sustainable community is characterized by such factors as environmental integrity, economic vitality and social well being.[3] Urban sprawl, congestion, increasingly poor air quality, and the shortage of land for affordable housing are some of the symptoms of unsustainable urban development. Trends in population growth, physical expansion of the city compounded by the ideology of economic growth and increasing levels of consumption are some of the factors further intensifying these symptoms.[4] The Earth's non-renewable resources are being depleted, mountains of solid, liquid and toxic wastes pollute the air, water and soil, and threaten local and regional habitats. As these current trends persist, it becomes more clear that solutions to seemingly environmental, economic and social concerns are linked and require more holistic solutions. This is the reason why environmental, economic and social policies have to be integrated in order to ensure the compatibility of all these elements.

The urban physical environment is a complex mix of natural elements such as the air, water, land, climate, flora and fauna, and the built environment such as buildings, infrastructures and urban spaces constructed or modified for human habitation and activities, aesthetic and historical heritage. While social values, behaviors, laws and traditions influence physical development, the environment influences human behavior and social relations.

Two characteristics of urban areas give way to consequences that may be detrimental for sustainable development. First, inhabitants and enterprises depend on natural resources to live and on natural processes for breaking down or diluting their wastes. Second, urban areas can concentrate a large range of environmental hazards, such as biological pathogens in the air, water and soil, chemical pollutants and physical hazards.[5] In other words, city-related environmental problems abound as rapid urban growth proceeds.

Therefore, through an official planning process, it is necessary to provide a framework for guiding the spatial development of human settlements in such a way as to minimize the environmental costs. Implementation of such policies is a shared responsibility of different levels of government, particularly the local authorities, the business community and the local people, in an understanding of partnership approach.

The main policies targeted at ensuring sustainable development may be summarized in the following categories[6]:

- Conservation, protection and enhancing of natural areas and life forms;
- Promotion of compact community policies;
- Optimization of density potential of existing urban areas;
- Limitation of the use of the car through the maximization of the use of public transport alternatives, including commuter rail, buses, bicycles and walking;
- Promotion of a sense of community, and creation of opportunities for social interaction;
- Preservation of the coherence of the landscape;
- Ensuring that environmental considerations and the precautionary principle become an integral part of the plans, policies, programs and projects;
- Integration of the concept of "net environmental gain" in assessing development;
- Encouragement of the development of medium-sized cities as a network of complementary urban settlements to big cities, in order to develop a more balanced hierarchy of human settlements, which will be sustainable; and,
- Encouragement of the utilization of already built-up areas so as to limit urban sprawl.

It is a surprising coincidence that the European Urban Charter (1992) encompasses, in each of its chapters dealing with urban rights, principles of sustainable urban development that originate from the main philosophy of sustainable urban development. The rights connnected with transport and mobility, environment and nature in towns, the physical forms of cities, the urban architectural heritage, housing, urban security and crime prevention, disadvantaged and disabled persons in towns, sports and leisure in urban areas, culture and health in towns, citizen participation, urban management and urban planning, economic development of cities are all regulated there with due regard to the principles of subsidiarity.

Particularly, the role of local authorities in ensuring sustainable development is carefully emphasized in the following terms:

- Local authorities should adopt policies to prevent pollution.
- Local authorities have a responsibility to protect nature and green spaces.
- City centers must be safeguarded as important symbols of identity, and of the European culture and historical heritage.
- The provision and management of open space in the city are integral parts of urban development.
- It is essential that the volume of travel, particularly the private car, be reduced.
- Multiculturalism and non-discrimination are fundamental aspects of urban policies.
- Citizen participation in political life must be safeguarded through the right to elect representatives, freely and democratically.

International Environmental Law, Environmental Politics, Urban Environmental Management, Local Government, are the major disciplines that constitute the general framework in which the goals of urban sustainable development can be addressed and resolved.

International cooperation

There are numerous bilateral and multilateral international mechanisms through which sustainable development can be realized. Cooperation among Mediterranean countries is an example. The Mediterranean countries have already taken action through a policy of cooperation. Seventeen Mediterranean countries signed in 1976 the Barcelona Convention for the implementation of a Mediterranean Action Plan (MAP) under the auspices of the UNEP. In addition and since 1990, the World Bank and the European Investment Bank (EIB) have combined their efforts in the Mediterranean under the Mediterranean Environmental Technical Assistance Programme (METAP).

As a UNEP-supported initiative, the Mediterranean Action Plan is an action-oriented cooperative effort today involving 20 countries bordering the Mediterranean Sea as well as the European Union. Within the framework of this cooperative endeavor, the Mediterranean countries are determined to meet the challenges of environmental degradation in the sea, coastal areas and inland, and to link sustainable resource management with development in order to protect the Mediterranean Region. The Barcelona Convention with its six additional protocols constitutes the so-called Barcelona System which aims at curbing pollution, protecting the natural and cultural heritage, ensuring the sustainable management of coastal zones and integrating the environment and development.

The Mediterranean Commission on Sustainable Development, established in 1996, is in charge of serving as an advisory body to MAP on such issues as sustainable management, sustainable development indicators, eco-tourism, information, awareness and public participation, free trade and environment, industry and sustainable development, and urban management.

The role of local authorities

Several programs exist in order to enable local authorities to play their role in ensuring sustainable development better. Agenda 21 reflects a global consensus towards integrated policy making concerning environment and development. In its Chapter 28, local authorities in each country are called upon to undertake consultative processes with their local populations in order to achieve a consensus on a Local Agenda 21 for and with their communities. Since 1992, in about 2,000 cities in more than 70 countries, local agenda 21 campaigns have been started.

The Istanbul Declaration (1996) adopted the strategy and principles of partnership and participation as the most democratic and effective approach for the realization of the commitments made during the Habitat II Conference. Paragraph 180 of the Habitat Agenda deals with decentralization and strengthening local authorities.

To increase local autonomy and participation in decision making, implementation, and resource mobilization and use, to support local authorities to acquire revenue-generating capabilities, to enhance the performance of local authorities, to enable them and their associations to take the initiative in national and international cooperation, and to share good practices and innovative approaches to sustainable human settlements management were among the recommendations of the Habitat II Agenda.

Moreover, various UN-supported urban environment activities, such as the Sustainable Cities Programme (SCP), Localizing Agenda 21s, the Urban Management Programme

(UMP), are all designed to improve the performance of local authorities to enable them to make sustainable urban development be established and persist.

Legal framework for international cooperation at local level

It is assumed that most of the urban development strategies are designed by the central authorities. However, local governments will have an increasing role in ensuring sustainable development. As noted in the Brundtland Report, the institutional and legal structures of local governments in many developing countries are inadequate. The lack of political access to an adequate financial base and a growing centralization make local authorities weak institutions that could not gain the expertise, autonomy and credibility needed to deal with local problems. In order to be able to address the problems of urban development, city governments need enhanced political, institutional and financial capacity.

Four opportunities available to local authorities may be mentioned in this context.

The European Charter of Local Self-Government

This convention was adopted by the Council of Europe in 1985. It has now been signed by 38 member states and ratified by 34 out of a total of 43 states. Belgium, France and Ireland are the non-ratifying EU member states as is Switzerland.

The Charter sets out the fundamental principles of local autonomy. The basic philosophy of the Charter rests on the belief that the degree of local autonomy enjoyed by local governments may be regarded as a yardstick for a genuine democracy. It aims to guarantee the political, administrative and financial independence of local authorities and it intends to commit the states that ratified the Charter to comply with its basic principles.

Local self-government, according to the Charter, denotes the right and ability of local authorities to regulate and manage a substantial share of public affairs, under their own responsibility and in the interest of local populations. They should be free to exercise this right through the decision-making bodies freely elected. In addition to the existence of elected councils, recourse to direct citizen participation (such as having assemblies of citizens, local referendums, etc.) has to be open to citizens.

The principle of subsidiarity is defined in the Charter in the following terms: "Local authorities shall have full discretion to exercise their initiative with regard to any matter that is not excluded from their competence nor assigned to any other authority. And public responsibilities shall be exercised by those authorities which are closest to the citizens. Allocation of responsibility to another authority will be allowed only depending upon the extent and the nature of the task and the requirements of efficiency and economy." The same principle is also enshrined in Article 3/B of the Maastricht Treaty.

Central control and supervision over local authorities is limited to the control of compliance with the law and with constitutional principles (legality control). State supervision with regard to expediency of the actions and decisions of local authorities is not allowed in principle. In order to be regarded as genuinely autonomous public entities, local authorities have to be provided with financial means which are commensurate with their responsibilities. The provisions of the Charter concerning their financial resources, equalization procedures and the safeguards for their political independence, all tend to strengthen local authorities in such a way as to carry out their functions in an appropriate way.

Consultation is another element of local autonomy which requires that local authorities be consulted in due time and in an appropriate manner, in the planning and decision-making processes for all matters which concern them directly. A final component of the concept of local autonomy, which is considerably important from the point of view of international cooperation for sustainable development, is the provision entitling local governments to form consortia and to have the right to belong to a national or international association for the protection and promotion of their common interests.

The Aalborg Charter

The Aalborg Charter is the second international document according to which nations can cooperate for the protection of the environment, through their cities. The First European Conference on Sustainable Cities and Towns gave birth in 1994 to one of the most important documents on sustainable development at the local level. Nearly five hundred local authorities coming from 35 European countries and representing more than 100 million European citizens have signed up to the Charter.

The Charter maintains that the city or town is both the largest unit capable of addressing the many urban architectural, social, economic, political, natural resource and environmental imbalances damaging our modern world and the smallest scale at which problems can be meaningfully resolved in an integrated, holistic and sustainable fashion. Therefore, it suggested that policies and the principle of sustainability be integrated into all policies. Thematic issues dealt with in the Aalborg Charter cover a wide range of spectrums from urban economy and social equity to land use patterns, urban mobility, responsibility for the global climate, prevention of ecosystem toxification and local self-governance. The Charter gives a clear message that economic development, social welfare and protection of the environment cannot be achieved separately from each other.[7] Perceiving citizens as the key actors and the involvement of the community in ensuring sustainability in addition to political, technical, administrative and economic tools and instruments for urban management towards sustainability characterize the basic philosophy of the Aalborg Charter.

The Aarhus Convention

The Aarhus Convention is an important international legal instrument adopted in 1998 by the European Economic Commission for Europe, that is relevant to international cooperation for sustainable development. It is literally called the Convention on the Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. Parties to the Aarhus Convention engage themselves in taking proper enforcement measures in establishing and maintaining a clear, transparent and consistent framework to implement the provisions of the Convention. States are also invited to make appropriate practical provisions for the public to participate during the preparation of plans and programs relating to the environment, within a transparent and fair framework.

It is beyond any doubt that a proper implementation of the Aarhus Convention will provide a unique opportunity to all concerned with environmental protection to contribute to the realization of sustainable urban development.

Transboundary cooperation

Local authorities in Europe are encouraged by a convention adopted by the Council of Europe to establish transboundary relationships in economic, social, cultural, environmental

matters (Madrid, May 1980). This is the European Outline Convention on Transfrontier Cooperation between Territorial Communities and Local Authorities.[8] It has been recently strengthened by two subsequent protocols in 1995 and 1998, respectively. The matters to be dealt with within the framework of transboundary cooperation are urban and regional development, energy, nature and water conservation, protection of the atmosphere, mutual assistance in disaster relief and the like. There is room for European territorial communities and authorities to enhance their cooperation for sustainable development by ensuring flexibility in administrative procedures, to remove the legal objections before fruitful cooperation and to equip territorial communities and authorities with necessary financial and other means.

Conclusion

In order to achieve sustainability and to meet the needs of rapid urbanization, international cooperation in both technical and financial fields is vitally important.

With respect to the institutional context for urban cooperation, the capacity and orientation of urban governments have to be changed. Local governments are not only responsible for urban policies and environmental management, but they also act as facilitators and enablers of action by all interests in the society.

States should remove all kinds of obstacles before the neighboring territorial authorities to develop transboundary cooperation. The Framework Convention for Transboundary Cooperation provides broad opportunities for local and regional cooperation towards sustainable development. Participatory land use planning, pollution control, transport planning, environmental impact assessment, economic and financial matters, administrative reform and public education, together with all aspirations expressed in the European Urban Charter, may form a suitable basis for cooperation.

Notes

1. World Commission on Environment and Development, *Our Common Future* (Oxford, Oxford University Press, 1987), p. 6.
2. The World Resources Institute et al., *The Urban Environment,* World Resources. A Guide to the Global Environment, Document II, June 1996. A special report from World Resources Inc., 1996-1997, p. 14.
3. Economic Commission for Europe, *Guidelines on Sustainable Human Settlements, Planning and Management* (New York and Geneva, 1996), p. 25.
4. *Ibid.,* p. 25.
5. OECD, Development Assistance Committee, Working Party on Development Cooperation and Environment, 21st Meeting, Paris, June 2000, *The Urban Environment and Development Cooperation, A Resource Book* (Paris, 2000).
6. ECE, *Guidelines, op. cit.,* pp. 26-27.
7. Anthony Payne and Peter Löffler, "The Aalborg Charter: Cities and towns on the move towards sustainability," *Naturopa*, no. 89 (1999), p. 4.
8. Council of Europe, *European Treaty Series Nos: 106, 159, 169, 194.*

The future of the Basque Homeland: An ekistic approach

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Introduction

The theme of this paper is that of synthesis of planning for the future of Basque cities – which I see as an appropriate microcosm of the general theme of these meetings: Defining Success of the City in the 21st Century.

Any discussion of defining success for future human settlements becomes, in an important sense, a footnote to Plato. Specifically, it becomes an explanation of the opening words of the *Republic:* "Since we know that every polis [human community or settlement][1] exists for some purpose ..."

This summary paper follows an earlier overview of Basque planning.[2] Both papers are products of my personal, self-financed research effort on the subject, which should be completed during the next several years. The present paper derives from a larger one presented at the WSE Berlin meetings, October 2001. That larger paper has been divided into three sub-papers for possible publication[3]:

- The first of the shorter papers summarizes an updated earlier effort, exploring what usefulness "ekistics" – as the applied science of human settlement development planning – may have in providing a framework of international professional knowledge, policy, and action in its subject matter. It is proposed that the Anthropocosmos Model be modified in specific ways to turn it into a full-fledged planning methodology.
- Second, another shorter paper recapitulates an updated attempt to explore the extent to which the Basque microcosm of human planning history and contemporary activity may potentially provide a useful *gestalt* for understanding that same subject matter in specific regions or areas elsewhere in the world. Deeper examination of the contemporary pattern and trends of ekistics-focused planning in the Basque Homeland then follow. Explanatory documents are appended to this second "short" paper.
- This third shorter paper provides tentative conclusions, which become a synthesis of the current practice and trends and of the major ekistic dimensions as they apply to this planning region of Europe, and beyond.

The objective of this entire body of writing is to address several major questions. These may be summarized as follows.

- What is "place planning" behavior and activity in any culture, and how shall we recognize it when it exists? This question is addressed largely by assuring that the fundamental "classic" anthropological and sociological insights are fundamental to our inquiry.
- Why is Basque culture and history potentially useful for providing a microcosm of human "place planning"? We point to a relative (not absolute) distinctiveness or "singularity" of Basque culture, linguistically, historically, and contemporaneously, that makes the Basque case particularly promising as such a microcosm. It is a very old and remarkable continuous culture, which now centers on "the Basque paradox." That paradox turns out to be simply a very distilled example of the universal human "old brain vs. new brain" complexity. In addition to these considerations, we present the reasons for which the Basque example may provide a useful prototype for autonomous linguistic and cultural regions elsewhere in the world. Finally, there is the history of negative stereotyping by contacting and neighboring cultures – again, providing useful insights for the many cultures elsewhere in the world which have been, and are being accorded similar negative stereo-

typing.
• What is the potential of the ekistics framework for the future planning of the Basque Homeland and – by extension – for other regions of the earth? On this question, I trace the recent history and pose the problem of gaining wider and more explicit acceptance of the ekistics approach, both in scholarly research and writing and in practice.
• Finally, I pose a series of minor modifications to the "Anthropocosmos Model" or matrix, as a way of enhancing the full potential of the ekistics approach.

The reader's understanding of the text that follows referring to the Basque Homeland in detail will be facilitated by the map in figure 1.

The evolution of the Basque prototype

The second of these questions – that of the Basque prototype – has necessarily drawn my most concentrated attention. I began with the evidence of a migration from somewhere in or near the Caucasus Mountains (probably in what is now the Democratic Republic of Georgia). This pre-Indo-European migration appears to have the first true human residents in much of Western Europe about 40,000 years ago. (The Indo-European Celtic and Germanic-speakers came more than 30,000 years later). Lacking any substantial evidence to the contrary, and based on what paleontology and linguistic evidence there is, I call these pre-Indo-European in-migrants the "Paleo-Basques."

I show how these Paleo-Basques improved upon Neanderthal hunting practices by using environmental adaptations to kill large and dangerous game animals. Within a few thousand years, the Paleo-Basques had developed the Cave Painting civilization of the high Paleolithic era. Recent research at Chauvet Cave has shown that all this started more than 30,000 years ago. Tracing the evolving interpretations of the immense body of animal-spirit art generated in this civilization, I show how scholars have come to believe that it was a form of strategic anticipation, conducted mostly by shamans seeking spiritual transformation into the form of wild animals. I show how these practices were to be later linked to more environmental modification in ceremonial building, and ultimately to urbanization.

This body of art suggests our central hypothesis on Paleo-Basque planning: that it was a fusion of "strategic anticipation," intendedly rational primitive science, and a strong enduring element of spiritualism or emotion. Extension of this hypothesis suggests that we may expect to find different mixes of these elements in Basque planning at various historic benchmarks.

- The practices of the High Paleolithic civilization seem to have spread sporadically, from place to place in southwest Europe and from time to time, for **about 20,000 years,** essentially disappearing about 1,000 years ago.
- There seems to have been no high culture in effect when the Indo-European in-migrants arrived **about 4,000 years ago.** By then, the Basques had developed small human settlements, hamlets, to support livestock and woodcutting operations. But full-fledged, fortified urban centers such as La Hoya in the age of copper probably involved both Basques and Celts.
- However, at the time of the **Roman invasion** of southwestern France, there was at least one unambiguously Basque fortified city, Sos. Its defense was the first historic record of Basque strategy, led by Aduatan.

The impact of the Roman domination of the Basque Homeland was important in setting the infrastructure of Roman roads and rural *vilas*, and especially in establishing *civitas*-rank Roman towns. There were an inordinate number, fully twelve, such towns in Southern France because of the special *novempopulae* policy that the Romans accorded the Basque-speaking tribes – as is documented in the "stone of Hasparen."

Yet we have no evidence that Basques (other than "king" Aduatan) were given any leadership status in these works and institutional arrangements. So the Roman impact may have been more superficial than profound, more at the level of training stone masons than in preparing planners. Then, within a few hundred years, the Romans disappeared from the Basque Homeland. On the other hand, most of the lowlands on the French side had become Romanized Gascognes, speaking Béarnaise or some other form of what is now called Ocitan, rather than Basque. This applied to the entire area of *Aquitania* lying south and west of the Garonne River. The reversion to a semblance of pre-Roman Basque culture was, already then, largely confined to the south of the Adour River. On what is now the Spanish side, the pattern was more complex and incompletely documented, some Basque being spoken at various locations north of the Ebro River. Yet Catalan or other forms of the Ocitan language were widely spoken, much further north.

- **The Dark Ages** brought numerous barbarian invasions by Germanic tribes, and later by the Moors, to the Basque Homeland. There was substantial contact between these cultures and the Basques, but none of it was enduring enough to have anything besides local effects.
- **Throughout the Middle Ages** the fate of the Basque Homeland was tightly tied to the Kingdom of Navarre, the initial kings of which were ethnic Basques (even though some form of Ocitan was always the official written language. One indirect effect of this kingdom was the establishment of some support facilities, including towns, for the pilgrims to Santiago de Compostela, such as was the model village of Ainhoa. Still other examples of planned urbanization came, as in Bastida/La-Bastide-Clairence, from Navarese attempts to exploit the British-controlled trade route along the Adour River. While there is no evidence that these planned community solutions were actually planned by Basques, both were constant examples of what a well-planned community would look like and how it would function.
- **The Renaissance** brought the defensive complex to some Basque cities, notably Baiona/Bayonne, Iruñea/Pamplona, and Victoria/Gasteitz, Donibane-Garazi/St.Jean Pied de Port, as well as Pau, just outside the Basque Homeland to the northeast. All of these examples and more were not for defense from Basque invaders but rather against potential nation-state invaders. Defenses in Spanish cities are always to the North, and those in France stress the South. Baiona/Bayonne was defended by the British against either French or Spanish invaders who might come from the sea. The designs of these fortress cities were all imports, but the Basques were instructed by them.
- **Under the French and Castillan-Spanish nation-states,** acculturated Basques came to have professional positions of serious influence, especially in the 18th, 19th, and 20th centuries. These professions included the priesthood and the military especially, but many other professions as well – including the building professions of architecture and engineering. From these posts of power, they became involved in the planning of the various urbanizations of the 19th and 20th centuries. The technification of such urban planning is known to have increased after 1850.
- This pattern of planning prevailed for spontaneous market villages and towns and for administratively inspired settlements (such as those mandated **after the French Revolution** to fill out the various categories of regional and local governance). It is all the more remarkable that Basque villages and

towns have retained some degree of distinctiveness, when compared to nearby settlements in France and Spain.

- The pattern continued into the **industrial era**, but in this kind of town or city it cannot be claimed that the same degree of distinctiveness was characteristic. Whether one talks about Bilbo/Bilbao or Bokale/Boucau (the industrial suburb of Baiona/Bayonne), it must be admitted that industrialism largely obliterated Basque (as well as Spanish or French national) distinctiveness in urban development.

We can identify a distinctive Basqueness in the urbanistic responses to industrial settlements. That much is clear in the urban designs for Bilbo/Bilbao of Ricardo Bastia in the very late 19th century. The fact that local leaders (Basque industrialists and bankers) were not wise (or culturally sensitive) enough to choose Bastia's plans does not detract from the value of them. Similarly, we can see distinctive Basque planning though in the responses to the "ZUP" of Bayonne, placed on a hill between the St-Esprit area of Bayonne and Bokale/Boucau and designed by the internationally eminent modern architect, Marcel Breuer. Facing substantial resistance from Basque and other residents (who called this vast project "the concrete wall" or "the citadel"), a major effort had to be made to "improve" it to be more in harmony with Basque culture. A $10 million effort by six local architects was able to effect no more than superficial changes.

- **Post-industrial urbanization**, in the form of tourism, and residences for vacation and retirement, began in the Basque Homeland early in the industrial era. The two key early locations were Miarritze/Biarritz in France and Donostia/San Sebastian in Spain.
- In the Miarritze/Biarritz case it was due to the choice of this location by Napoleon III and his bride, Eugenia of Spain, as their border vacation residence. Displaced and retired aristocrats from throughout Europe followed, and a wave of wealthy individuals and families followed.
- Donostia/San Sebastian was not so heavy on international aristocrats and the wealthy but heavier on Spanish from the hot interior and south seeking a cooler summer vacation location.

In both cases, but especially on the French side, there was much competition among the wealthy to have distinctive detached residences, and much of the distinctiveness had to do

Fig. 1: Euskadi, the Basque Homeland – General reference map. (*Source:* Philippe Gloaguen et al. (eds.), *Pays Basque (France, Espagne), Le Guide du Routard,* (Paris, Hachette, 2002).

with an attempted imitation of things Basque. Most notably, the *etxea* (written in French as *eche*), the traditional Basque farmhouse of coastal France was distilled, refined, distorted by a host of architects who produced versions of it throughout the French Basque Homeland and far beyond. The "neo-Basque" style of architecture was born. With the coming of the automobile, and especially with developments since World War II, whole tracts of suburban dwellings in this style have begun to develop throughout southwestern France. The phenomenon is less marked in Spain but still in evidence.

Genuine Basque place-planning had a new stimulus in the extension of environmental planning powers to the Basque Autonomous Community in Spain, when the socialists came to power following the demise of Franco. That approach is still developing, and it is having its impact beyond the borders of the Community – both in Navarre which is outside the Basque Autonomous Community and on the French side of the Basque Homeland.

At the same time, the fields of planning have been evolving both in France and in Spain. Modern urban and regional planning in both countries are much less limited by the strictures of the architectural profession. The term *aménagement* (spatial planning or ordering) has largely displaced *urbanisme* (urban design) in France, where the environmental movement has also become a large part of local planning. The same trend, though much less marked, is evident in Spain.

Basque planners, especially in France and to some degree in Spain, are still too constrained by national laws, regulations, criteria, and financing for them to fully show what they would do under the situation of any real autonomy. Generally speaking, they do the best they can under the situation. They do some impressive work, work that is sensibly distinct from that done in nearby non-Basque areas. No strong trends are yet in evidence.

We have examined Basque planning of the region's cities of the past and present, and we can see from this information some possible trends toward the future. But the future of Basque cities is not merely a matter of forces internal to the region, surely not in an era of anticipated globalization. What can be said about the environment of globalized urbanization in the century ahead, for whatever happens to Basque cities is certain to be very much a function of that general pattern?

Basque use of strategy in built environment

It may be useful here to recapitulate the story of how the ancient Basques increasingly applied strategy to their built environment. We have noted that the adaptation of the environment for hunting purposes was from the beginning the signature of these early Europeans. But, so long as they remained semi-nomadic hunters, the use of strategy in the modification of their own domestic environment seems incremental at best – with very long periods during which no change was discernable.

Etxe: The Basque house

With the domestication of herd animals several thousand years ago came the importance of the individual house, the *etxe* in Basque. It is a highly functional structure, and yet it came to have a deep spiritual and religious significance that is still retained today in some places in the rural Basque country. The ground floor of a Basque house[4] is considered a kind of sacred temple because it is the point of contact of a Basque family with the underworld, where reside a number of important spirits. The roof is viewed as the point of contact with the sky, with all its spiritual significance.

The key to understanding how a family household worked is the role of the *etxeko-andere* (very literally "the lady of the house") who is in every sense the key person in the household. She is described in recent literature as "the minister of the cult of the house," and there are a whole series of rituals, some Catholic, some pagan in origin, over which she presides. Almost a mirror image of the main family house was the summertime shepherd's mountain hut, in which a number of men lived together, often from neighboring households. One of these men (sometimes on a rotating basis) is designated *etxeko-andere*, and virtually runs the summer household during that tenure.[5]

Exalde: The Basque farmstead

Literally, "the place of the house" is the farmstead or property surrounding a house. It shares with the house the attribute of functional spatial organization, but there is more variety in the details of spatial arrangement. There is also almost no hint of sacredness to the farmstead. However, some Basque informants (2001 interviews) did tell me there were a set of rituals to bless the fields, livestock, etc.

Herrixka: The Basque small village or hamlet

The very small Basque village was invented within the Basque region about 4,000 years ago, well before any hint of in-migration of Gauls or Germanics into southwest Europe. These comparatively concentrated settlements were surely developed for economic, social, cultural, and perhaps political services to agricultural, livestock, and woodcutting hinterlands. Grain storage (so important in Middle Eastern villages) does not seem to have been one of these functions. We have no evidence of specific religious rituals related to the early *herrixka*. They do not seem to have been sacred in the sense that the Greek polis was, though it is difficult to imagine that they would have been entirely devoid of spiritual functions. Some of them, indeed, may well have served as centers for shamanistic activity, especially if there were nearby caves. (This may easily be imagined from the famed border village of Zugarramurdi, which clearly served as such a center even in 1600, several centuries after the advent of Christianity. One has only to eliminate the parish church from Pablo Tillac's sketches to picture how a first millennium pagan village might have been.[6]

"The localization of the places of the 'sabbat' [the chief Basque pagan witchcraft ritual] are revealed as particularly instructive. We can distinguish several tendencies, among which first is the tight relation that exists between the locales and the ancient cult sites – or at least of prehistoric and historic habitats. It was already the case in the reports of 1609-1610, especially in the Spanish Basque Country where often impressive natural refuges particularly excited the imagination of populations. The cave at Zugarramurdi, extraordinary for its proportions and configuration of levels, thus appeared as a veritable 'Sabbath cathedral' and re-appeared often in the depositions of the witches of the surrounding area. The cave is otherwise crossed by a stream called 'Infernukoerreka,' [Basque for] the Creek of Hell."[7]

This extraordinary tunnel-like cave plus sacred stream is located barely five hundred meters from the several residential and storage buildings at the center of the historic hamlet of Zugarramurdi, giving it special status as a kind of "spiritual hamlet." (During the inquisition of 1609-1610, 40 women of Zugarramurdi were accused of witchcraft, and 17 of them were put to death).

The implication is that, while the early Basque hamlets were generally spread over the territory, probably in correlation with, and as service centers to, the livestock and farming activity, the

"spiritual hamlets" on the other hand would have been concentrated around areas of historic and prehistoric caves – such as the Xarita zone between Sare and Zugarramurdi, and a few other areas where the density of such caves is concentrated.

Gotorleku or Gastellu: Basque stronghold towns

These fortified towns were widespread north of the Pyrenees and there were some examples to the south of the range. Archaeology has yet to reveal any unambiguously Basque example of a very early fortified town, although we know there were many north of the Pyrenees and at least several south of that range. One obvious top priority would be the site of Sos, the largest true pre-Roman city of Aquitania. Another would be further work at Larroque, the *oppidium* near Sorde l'Abbaye, which has been incompletely excavated.[8] For now, we must suppose that the Basques learned to fortify human settlements from, or in imitation of, the Gauls. We have discussed La Hoya above.

The Basquo-Roman *Civitas* town and *vila* rural estate

As discussed above, we have twelve full-fledged Roman *civitas* towns in France and two in Spain as the basis for discussing this kind of settlement planning. Excavations are so incomplete and written records so scant, however, that we really still know relatively little about them. Most of the numerous French examples have hardly been excavated at all, though perhaps Dax, there, and Pamplona, in Spain, are the most promising. We do of course know quite a lot about the planning of Roman towns in general. At the present state of knowledge we must suppose that the Basques were little involved in the planning and design of these *civitas* towns.

Another area fertile for archaeology is the rural *vilas*, which were the basis of rural spatial structure in agricultural areas. Two of these Roman *vilas* have been excavated incidental to the study of a medieval site[7] and many more are known to exist.

Medieval and Renaissance new towns and Bastides

The examples of Ainhoa and La-Bastide-Clairence were discussed above. Clearly, non-Basque forces were predominantly influential in their establishment. What remains to be established is whether the many other settlements of the same period, which evolved out of spontaneous economic and political forces rather than outside intervention, bear any traces of Basque influence.

Larger market-villages and commercial towns

Spontaneous market and political forces are also thought to be crucial in the formation of market-villages and in the evolution of larger commercial towns, especially in the 17th and 18th centuries. How were such forces articulated by Basque culture of the day in (what is today) both France and Spain?

Industrial towns and cities

We have discussed the efforts of planning the large industrial city, in the case of Bilbo/Bilbao at the turn of the 20th century, above. Similarly, we have looked at Boucau, the industrial satellite of Baiona/Bayonne. However, much needs to be filled in regarding the numerous smaller industrial centers, in both Spain and France, from the mid-19th century onward.

Metropolitan planning

While we have outlined the beginnings of the planning for the BAB (Bayonne-Anglet-Biarritz) *Agglomération,* much remains to be filled in on the evolving arrangements for such metropolitan planning, in both contemporary nations. Crucial to the present work is the input of Basque culture into such urban-regional decision making. This will be necessary to set the stage for thinking about the planning for the emerging Basque Coastal Megalopolis, as well as for its satellite metropolises in Iruñea/Pamplona and in Victoria/Gasteiz.

Basque Homeland-wide regional planning

The emerging framework for planning by the Basque Autonomous Community in Spain needs to be detailed more adequately, as well as the potential transfer or expansion of such practices to the possible new *département* of the French portion of the Basque Homeland.

Alternative *gestalt* (holistic) views of a successful urban future

The ekistic Ecumenopolis end-state

With the publication of *Ecumenopolis* in the mid-1970s, the ekistic literature fully presented its classic view of the human city and what to do about it. Papaioannou's recent writing provides an updating of that view.[9]

The Ecumenopolis view developed at about the same time as a series of multiple-variable models, both conceptual and mathematical, after 1960, to try to forecast the future of contemporary urban societies, generally in the aggregate. Fundamental to these was the Club of Rome on the "limits of growth," an attempt to show mathematically that natural resources and pollution must at some specific point constrain future population and economic growth. The "City of the Future" explicitly recognized the Meadows study and its conclusions, but it did not really follow the sophistication of the methodology; and it departed fundamentally in its very different conclusions. *Ecumenopolis* also completely ignored a series of econometrically inspired "urban systems" models by Forrester, as well as a series of metropolitan economic, housing, and land use models.[10] In brief, the City of the Future project did not derive from any of the more sophisticated interactive simulation forecasts. There was neither a well-developed environmental component nor a well-developed economic component interacting with the population projection – though separate energy and income projections as well as more intuitive environmental, economic and technological forecasts were collated with the population forecast. In essence, it was a quite straightforward population projection, with implicit but not explicit environmental, economic, and technological forecasts. It cited the formal goal-interactive methodology that was used in the Doxiadis Associates Detroit study, but the "IDEA" was never central to the City of the Future project itself. Finally, the approach was entirely preoccupied with the end-state of complete world urbanization, not allowing for possible constraints to that end-state or countervailing forces to it.

Anis-ur-Rahmaan's proposed synthesis of future cities

Writing at about the same time as Papaioannou's updating to the Ecumenopolis synthesis, but working much more directly from futures-research methodologies, Rahmaan came up with a potentially even more useful synthesis. He interacted four factors, "global economic restructuring," "political alliances for development," "globalization of technology," and "global socio-

cultural diffusion," to provide an aggregate synthesis. Then he applied this to cities. There were four components to Rahmaan's model:

- Alliances for development;
- Globalization of technology;
- Global economic restructuring; and,
- Global socio-cultural diffusion.

These "functional determinant" components, in interaction, lend themselves to presentation as a prism (fig. 2).

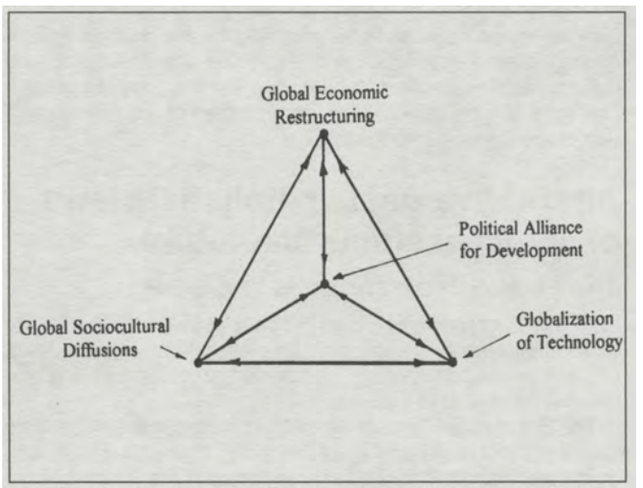

Fig. 2: The salient determinants of the Global City. (*Source:* Rahmaan, 1999).

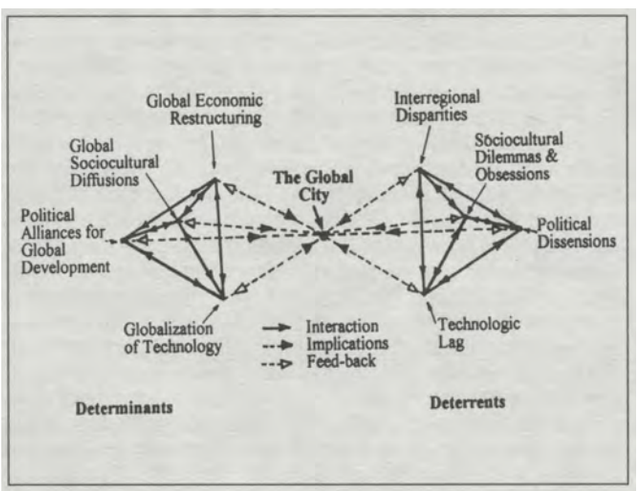

Fig. 3: Physical implications of the functional determinants and deterrents on the Global City. (*Source:* Rahmaan, 1999).

This aggregate *Gestalt* has physical implications for the "Global City" (fig. 3) as Rahmaan says[11]:

> It [the diagram of the functional determinants and deterrents] comprises two sets of diametrically opposite, highly dynamic and interacting variables, one facilitating and the other hindering the formation of the Global City. Each set interactively impacts the Global City and in turn gets a feedback from it through a system of two back-to-back prismatic frameworks. The beauty of the back-to-back prismatic frameworks is that each of the five variables in each set is directly connected with each other and can influence – and in turn be influenced by – each other.

Joel Cohen's vision of the world's urban future

Let us take as a point of departure the "model" of the demographer Joel A. Cohen, which he put forth about four-and-a-half years ago (1998).[12] Here it is:

> 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.

Cohen foresaw that many contemporary rights and obligations will be supplanted by markets. One example will be permits to permanent residence in specific cities. The prices of these rights will probably be added to real estate prices or rents. Cities will compete with one another for market rewards for public goods offered. The rights to leave any city or region will have to be balanced against the rights to move to specific cities and nations. Social and individual values will determine the point to which markets will be permitted to intrude into relationships that were previously determined by culturally traditional methods. He sees women largely freed from childbearing and child-rearing roles as the average woman comes to have two, one or no children in a longer lifetime. Women will intensify their demands for more significant roles. Implications are increased educational and.employment opportunities. The aging of population will increase dramatically and among the aged, women will outnumber men 2:1. Whole new social arrangements will develop among the elderly.

In Cohen's projection, growth of the world's human population will end sometime in the 21st century, but some regions will continue to be net importers or exporters of people. Growing pressure for migration from poorer countries to richer ones will stress countries that are culturally xenophobic – as well as those traditionally receptive to international migration. The result will be many frictions until human beings learn more courtesy and tolerance. Interracial mixed marriages will produce a whole spectrum of skin coloration in many regions.

Cohen's forecast of the bio-physical environment is especially important for our purposes. He says the continental shelves of Asia and other land masses will be developed to provide food, energy and perhaps residential space. The partly depleted stocks of most marine species will be carefully managed, to an extent far beyond the limited "farming" of seafood that exists today.

Those woodlands and forests that survive the growth of population and economic exploitation of the 1920-2050 period will be preserved as educational and touristic curiosities. Many of these will also be meticulously managed for fibers, food, pharmaceuticals, and recreation. The simple agricultural ecosystems of today will be replaced by others of great complexity. Biological controls and the optimizations of farmers will maximize production, while pesticides and herbicides will be almost entirely eliminated. Inputs to agriculture required for food and energy will be derived from human, animal, and industrial wastes – replacing many of the fertilizers and organic combustibles of today. Undesirable effluents, such as eroding soil or agricultural drainage with pesticides and fertilizers, will be eliminated or converted into productive inputs for industrial or urban uses.

Also managed will be the atmosphere. Rights to add carbon dioxide, methane and other chemically significant trace gases and particulates will be negotiated in the open market, for services that natural ecosystems provide. Governments will recognize the potential of the atmosphere and of many other services that ecosystems provide, to produce taxes that will support other public services. Gases will be manipulated as part of the production of foods and management of wild flora and fauna. An example is genetically engineered bacteria that will manipulate production of agricultural methane. Flora and fauna will be revalued as it is realized that we do not know how to multiply old woodlands, coral reefs, and the diversity of living forms. The genetic resources of nature and aesthetic amenities will be more and more highly valued. Conservation movements will gain renewed force, in collaboration with commercial enterprises.

> The intensive management of continents, oceans and the atmosphere will require massive improvements in the collection and analysis of data and, especially, in our concepts. A century from now, we will live on a land totally interconnected electronically ("a wired earth"). Land, air and the sea will be continually monitored. Just as the meteorological stations, on the earth and in satellites, of today, we will monitor the atmosphere, the oceans and terra firma of the next century with networks of sensor stations at all heights and depths.

Mathematical models of the earth, the air, and the sea will try to predict major events, such as El Niño, hurricanes, earthquakes, volcanic eruptions, plumes of hot water from cracks in ocean floors and principal ocean currents. The models will improve with increases (at least a million-fold) in computational power during the next century. The models will integrate not only the atmosphere and ocean surfaces but also human populations and populations of other biological forms (including domestic animals, trees, cereal products, and infectious diseases), economic reserves and flows (including all natural resources, information and flows of information – scientific, literary, artistic, folklore – and family, social, institutional, and political constraints and resources). Integral models will include factors outside human control such as solar flares, and will represent, without predicting, human decisions.

Despite improvements in software, concepts and administration, the earth will still bring surprises. Geophysical surprises spring from being more conscious of what the planet does, of instabilities inherent in geophysical systems, as described by the mathematics of chaos theory, as well as from additional human impacts. Included in these "surprises" will be a continuing stream of human illnesses due to infection from newly-discovered viruses, as well as from the continuing increased densities at which the human population will reside. As concerns economy, culture (and politics):

> Economies will increase their integration. Cities are going to concentrate the talent and resources required for international commerce. Almost no product complex will be conceived, financed, designed as to engineering, produced, sold, used, and taken out of use within the boundaries of a single political unit. Businesses will learn to profit from the eternity of atoms, designing products for use, return and regeneration. Governments will find that an increasing percentage of the power to control the economic welfare of their citizens will reside outside their political boundaries. Economic integration will give profit to those who can recognize the comparative advantages of other societies. Information will become more and more valuable. Those who can create, analyze it, and manage data bases will be the winners. Information technology and economic integration will grow hand in hand. Culture will penetrate everything regarding the population, the environment, and the economy. The productive and reproductive roles of men and women, for example, will define which biological materials are seen as food and which not, and its form as demanded by consumers in the economy.

A modification to the Cohen model

Soon after the publication of Cohen's vision, the present author produced a critique of it.[13] He pointed out some conceptual problems in Cohen's formulation (partly confirming, as Cohen had predicted, that some of the hardest problems of the future would be conceptual).

- First, Cohen's main "analytical pyramid," which he used to reach many of his conclusions about the urban future, was overly simplified in terms of what Cohen himself had to say. Rather than a simple pyramid, with a base and three diagonals (environment, then population, economy and culture), there were really six dimensions: an environmental base, and five diagonals, with the addition of "technology" and "politics" from Cohen's own discussion. So we had to be working from a "pentagonal pyramid."
- However, two of the supposed diagonals (culture and population) are problematical. (Are we talking about merely population numbers or are we into the characteristics of the population? Apparently the latter). Then population is not a straightforward quantitative variable such as mere numbers of people would be. Thus it has to be seen, diagrammatically, as a "second base" rather than a diagonal. Similarly, "culture" is problematical. These conceptual refinements will be necessary for good integration of Cohen's "prism" with the Anthropocosmos Model of ekistics, as well as with the model of Rahmaan.
- Third, one important implication of this refined conceptual analysis is more urbanization, into even larger metropolitan areas. Mann estimated that there would be, globally, even more and larger metropolitan areas, even though the population of the earth will be slightly declining. He foresaw an ultimate urbanized population of between 250 and 2,500 metropolitan regions of between 15 and 50 million people. The hinterlands around each of them will be rough hierarchies of service-providing villages and towns, rather than the homogeneous low-density areas Cohen anticipated.
- Finally, rather than the unrelieved rational globalization of Cohen's vision, Mann foresaw strong pockets of traditionally dominated metropolitan regions. He noted that Cohen's vision evokes the "God is dead" of Jean-Paul Sartre in the late 1940s and the parallel "Ideology is dead" of American futurists of the 1950s – both of which we now know to have been vastly overstated. Evidence is to be found in the resurgence of fundamentalist religions and regional ethnic political movements in various parts of the world.

Ekistic synthesis

The present author's thesis is that the Ekistic Anthropocosmos Model, appropriately enlightened by the formulations of Rahmaan and Cohen/Mann, will prove the best way to conceptualize the future Basque urban and environmental planning system, evolving in the direction of its prehistoric and historic trajectory – however truncated by specific events of history. The Basques are ready to plan for the kind of future that Doxiadis and his group foresaw, as well as the Rahmaan and Cohen-Mann images of the future. What remains to be worked out are the intricacies of synthesis of the various ekistic elements and units, appropriately interacted with each other and with the several other dimensions I have suggested as extensions of the model above.

What lies ahead for the Basque region in the next several hundred years is a very major coastal metropolis. It will extend from some point north and east of Bayonne through Donostia (San Sebastian) and probably including everything between and somewhat beyond the Bilbo (Bilbao) metropolis to the western and southern edges of the Basque-speaking region. It will be a complex, multi-nucleated metropolis, with precious

bits of lower density and more traditional ports and ecological preserves dotting the coastline. My hunch is that this huge metropolis will reach some 15 million in population by the year 2500. At various points, major natural forest, tourist, and preserved agricultural and livestock grazing corridors will reach out to the internal metropolises of Iruñea (Pamplona) and Vitoria-Gasteiz – as is already the pattern from Donostia (San Sebastian) and from Bilbo (Bilbao) and as is already planned for Baiona (Bayonne) to Pamplona. It is possible that one more modest interior metropolis will evolve between Iruñea (Pamplona) and Vitoria-Gasteiz, probably centering on Logroño. The interior metropolises will probably have ultimate populations of between one and five million inhabitants

Outside the metropolises will be the "global garden" of agricultural and natural woodland and forest preserves. The Basque country on both sides of the Pyrenees is ready for this, for that is what has been evolving by spontaneous forces in the region – with heavy growth of retirement and second-home developments. Still, it will be the most challenging kind of planning because of the necessary balance between preserving cultural practices and providing modern conveniences.

Notes

1. This version of the larger paper was prepared during the months following its presentation in Berlin. New material is set off in brackets. The immediately prior version of [the larger] paper was "Euskal Herriko Ekistika," at the Čelakovice meetings of the World Society for Ekistics, June, 2000. Both papers are alternative, ekistics-oriented parts of another paper "Basque Planning: An Overview," being prepared for the *Journal of the American Planning Association*. One or two other papers should follow next year. All of these anticipate a larger, monograph-length work in progress on the subject, which is expected to be completed for publication during coming years.
2. See C.J. Friedrich (1959), "The concept of community" in C.J. Friedrich (ed.), *Nomos II (Community)* (New York, American Academy for Political and Social Philosophy).
3. "Basque Ekistic Planning and the Future of Human Settlements in Europe's Western Pyrenees Region: Updating the Euskal Herriok Ekistika Research Project" (processed). Available from the World Society for Ekistics, Athens, Greece and from the author.
4. There exists a very large bibliography on the Basque house in Spanish and French, as well as in Euskara/Basque. See Bibliography.
5. Note that the attribution of a woman's role to a man in this case is recounted as straight humor, entirely without sexual innuendo. Note too that the male(s) in the "woman of the house" role have no religious or ritual functions, which are a major characteristic of the role in the main farmhouse.
6. See Claude Dendaletche, illustrated by Pablo Tillac (2000), *Les Sorcières de Zugarramurdi* (Cahors, Editions Auberon).
7. Sight translation by the author from François Bordes, *Sorciers et Sorcières: Procès de Sorcellerie en Gastogne et Pays Basque* (Toulouse, France, privately published, 1999).
8. See Robert Arambourou (1962), *"Aux Origines de Sorde l'Abbaye,"* in Les Amis des Eglises Anciennes des Landes, *Les Eglises Anciennes des Landes* (Dax, The Organization), pp. 9-23; Jean Cabonot and Delphine Meyer (1998), *Sorde l'Abbaye* (Dax, Association des Amis des Eglises Anciennes du Département des Landes), 49.
9. See Doxiadis and Papaioannou (1974), *Ecumenopolis;* Papaioannou (1998), "Megacities versus Megalopolises"; and Papaioannou (1999), "Tomorrow's world."
10. See D. Meadows et al. (1972), *The Limits to Growth* (London, Earth Island, for Potomac Associates); Jay Forrester (1969), *Urban Systems Dynamics* (Cambridge, MA, MIT Press); John Kain and others (1970-1985), various publications on the "NBER Urban Housing and Land Use Model" (New York, National Bureau of Economic Research) and literature cited there.
11. See Anis-Ur-Rahmaan (1999).
12. See Cohen (1998). Based on a talk by Cohen to the Syndics of Columbia University in March 1997 at Biosphere 2, Oracle, Arizona, USA.
13. See Mann (1998). Available in Spanish from the author or through the Program Office, College of Architecture, Planning and Landscape Architecture, University of Arizona.

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What could be considered a successful city of tomorrow

Vassilis Sgoutas

The author, an architect, is currently President of the International Union of Architects (UIA) and has played an active part in the various activities of the Union as a member of the UIA Council between 1985 and 1990, then Vice President for Region II from 1990 to 1993 and Secretary General from 1993 to 1999. Born in Athens (Greece), Vassilis Sgoutas graduated from the University of Cape Town in 1957 and has his own practice in Athens. Projects carried out both in Greece and the Middle East include public buildings, industrial architecture, commercial buildings, hospitals, rehabilitation centers, restoration work and landscape architecture. He has won numerous awards in competitions including 2 of 30 ex-aequo prizes awarded by the Greek Ministry of Public Works for the best buildings of the period 1973-1983 and the Ministry of Environment ex-aequo award for innovative housing. He was President of the Greek Section of the UIA from 1981 to 1993 and has been a representative Council Member of the Technical Chamber of Greece (TEE) since 1984. He is actively involved in matters related to the environment and the disabled. He was a member of the EEC Helios Committee for the Handicapped (1989-1993); member of the Experts Committee for the "European Manual for an Accessible Built Environment" (1990) and the "European Concept for Access" (1995). He is a Board member of the Athens Forest Association and the Greek Spastics Society and a member of the World Society for Ekistics (WSE). The text that follows is an edited and revised version of an address by the author in his capacity as President of UIA to the annual General Assembly of the WSE following the WSE Symposion "Defining Success of the City in the 21st century," Berlin, 24-28 October, 2001.

Introduction

I have just come from Veracruz, Mexico where I went straight to the airport from the concluding meeting of a UNESCO-UIA Conference on "Educational Architecture for an Architecture without Exclusion."

For me it was very important to be here, for three reasons:

- First, because Ekistics is now, more than ever, relevant. In a world where the built environment is not equitable, in a world where the built environment has become vulnerable, especially after the tragic events of 11 September, the thought-provoking processes that Ekistics initiates have much to add to any debate.
- Second, for meeting friends and being in an entourage that feels like family, starting with Panayis Psomopoulos, but also Mit Mitropoulos, Alexandros Papageorgiou Venetas, and so many others.
- Last, for personal reasons: This, my first ever presence at one of your assemblies, is the fulfilment of a sentimental journey for me. I was born into Ekistics, architecturally that is. My first ever job was with Doxiadis in Baghdad.

Let me say just one more thing about Ekistics. I sometimes feel that if Ekistics had not been created years back when it was, it would need to be invented today.

To conclude this introduction, I wish to say a few words about the UIA. The UIA, the only world organization of architects, has 102 member sections representing over 1.2 million architects. The organization is becoming increasingly influential and is the reference point for the international practice of our profession. Its close links and common programs with UNESCO, UNCHS, WTO, IOC and other world bodies make it a key player in shaping a better future for architects and architecture.

The events we organize can be big and far-reaching. Witness our congresses. In Barcelona in 1996 we had 10,000 registered participants. Mounted police had to be called in to disperse architects trying to get into halls already filled to capacity. It was then that we switched to the Isozaki indoor stadium. In Beijing in 1999, it was quite a sight to see young architects and students literally stampeding over auditorium seats just to touch Tadao Ando. Berlin, this coming July, promises to be a huge architectural happening. With its theme "Resource Architecture" it will also be a platform for debate on the future of architecture.

Cities and success

It was with great expectation that I heard the theme of this Conference – "Defining Success in the City of the 21st Century". The two operative words are "city" and "success." You have clearly approached the problem with a positive approach. This is how it should be. As Peter Elyard said during the UIA Chicago Congress, we have had enough with problem-centered approaches, we need a mission-directed approach. And the World Society of Ekistics has, with this Conference, set a mission – "successful cities."

We always like to think that we are at a crossroads or that we are crossing thresholds. This is good. It shows that our actions can bring results, can lead to better cities and to a more equitable built environment. It shows that we must not let the future happen but that we must continually shape it the way **we** want to and not the way others would like it to be.

I now want to put to you some aspects of what could be "success" in the city of tomorrow.

- **Success No. 1: Lessen the social segregation of space**

Our cities are full of barriers – social barriers, cultural barriers, economic barriers, and of course physical barriers, for example the segregation between affluent and poor districts. Barriers create frontiers. And frontiers create the dispossessed.

The situation is unlivable in most cities. Even the cities of

the developed world can no longer exist in watertight cocoons. Migration has changed that. The problems of the less developed world are on our doorstep. And we know that the realities of these cities, where the air is unbreathable, the water undrinkable and the waste unmanageable, are not too different from Dante's Inferno, the "città dolente" as he termed it.

So what can we architects do ?

I am convinced that we can have a role in the lessening of the social segregation of space. Fighting exclusion must become part of our regular professional activities. We must partake at the decision-making level and also facilitate "boardroom" decisions to become action.

How?

- By helping important new buildings be sited in the less affluent parts of cities, thus creating a physical and social uplifting momentum. Architecture can thus become a tool for social reinsertion.
- By preserving and rehabilitating the cultural heritage of cities. Listed buildings are often located in underdeveloped areas. The process of caring for them and of creating space around them will inevitably lead to a sense of civic pride and thus lessen exclusion.

These are but two examples. What is important is to remember that space is our remit and also that space is political. And that we architects can be instrumental in lessening the social segregation of space by using it not only architecturally but also politically.

In the aftermath of the recent tragic world events, our role has acquired an added dimension. We will have to make good with less funds. Because, clearly, security and armaments, or defence as it is euphemistically called, will absorb a greater share of budgets, thus leaving less for what we cherish most – a better built environment.

I want to add a note of despondency. We architects are probably designing no more than 1 percent of the buildings of the world. It cannot be that we are not needed. I think that in the future we must focus much more on social housing and on architecture that is distanced from the "glossies" and answers the needs of the needy, the needs of cities away from their limelight areas. We can prove that quality is compatible with social architecture.

- **Success No. 2: Encourage the development of intermediate cities**

Intermediate cities, which are, in fact, the "great silent majority" of cities, can be the key to a more logical development. They can help lessen the catastrophic gigantism of the large metropoles.

It is worth remembering that intermediate cities should never be defined by their population but rather by their role in the specific context of their countries.

- **Success No. 3: Use judiciously the intermediate space within cities**

Whether one calls this intermediate space "brownfield sites" or "terrain vague," the answer can only be one. Judicious use of this space will liven up cities, will brighten the cityscape. Needless to say, it will also save "greenfield sites."

- **Success No. 4: Strive to ensure that housing be deemed a human right**

This is, of course, politically difficult to entrench, especially in countries where laws exist in order to be implemented. But the de facto acquisition of shelter by more and more people, through social housing, self-help housing or in whatever other way, can lead to almost the same result.

The importance of security of tenure cannot be overstressed. One of its side benefits would be that citizens would care more for their cities.

- **Success No. 5: Work for the humanization of space**

We say a clear "no" to the globalization of culture. Our cities need the presence of our several cultures. We will, otherwise, witness an increasing lack of identity and humanity in our cities. And we are all fully conscious what this lack of identity and humanity entails. It entails a further diminishing of the quality of our lives.

Yet we know that, important as the preservation of our architectural heritage is, it cannot atone for lack of creativity. While it takes energy and courage to preserve one's heritage, it takes greater energy and greater courage to lead society towards an architecture that reinterprets culture in the form of contemporary architecture.

Let us also remember what Fredric Jameson said on space, following up on thoughts by the philosopher Wittgenstein: "We must ask ourselves whether we can think of spaces that demand new kinds of living, that in turn demand new kinds of spaces".

This can only mean human spaces, convivial spaces.

- **Success No. 6: Take the lead in collaborative endeavors to upgrade cities**

Architecture is a collaborative art. In the interdisciplinary teams that necessarily plan and direct projects and programs for cities, architects should have the lead role, they should be the first among equals, the primi inter pares.

What is the role of us architects in multidisciplinary projects? I strongly believe that it is in the best interests of society that we architects don the mantle of leadership. We are, after all, by our education and by the practice of our profession, best equipped to be the coordinators or, let us not be shy in our use of words, we are best equipped to be the leaders of the team and thus to ensure the continuum of culture and the creation of a "preferred" future. The continuum of culture, albeit so intangible, is of real public interest. It is our duty to convince authorities and public alike that this is a cornerstone of the existence of our several civilizations.

Conclusion

The future of the cities of the world can be in our hands. But we need a dream. For, as Martin Luther King said, "if you don't have a dream, you can't have a dream come true."

I consider it a happy coincidence that your Conference and Assembly are being held in Berlin, where next July the UIA will be having its 21st World Congress. We expect over 10,000 architects and students to be there.

In Berlin, we will need your intellectual contribution, we will need the compounded knowledge on architecture and town-planning that the World Society for Ekistics has acquired over the years. Your meaningful debate during our previous Congress in Beijing in 1999 is testimony to what you can offer.

Let us work closer together in the future. The UIA commits itself to this. You can also be assured of my personal dedication to common end results.

Symposion: Defining Success of the City in the 21st Century

Part 9: Conclusions

Chairman : Udo E. Simonis

Presentations: Thomas W. Fookes, Panayis Psomopoulos

Success of the City in the 21st Century: Some thoughts arising from presentations

Tom W. Fookes

Dr Fookes is an Associate Professor in the Planning Department, University of Auckland, New Zealand. He has worked variously through the past 36 years as a geographer-planner, academic, environmental impact assessor, policy analyst, and professional planner. A defining moment in his career path was the two years spent as a student with C.A. Doxiadis at the Athens Center of Ekistics in Greece. As a consequence he has carried through the principles and practices developed in Athens into his professional life. Dr Fookes is leading research and development on Ekistics in Education, and he is currently Vice-President of the World Society for Ekistics (WSE). The text that follows is a slightly edited and revised version of some of the thoughts he presented at the WSE Symposion "Defining Success of the City in the 21st Century," Berlin, 24-28 October, 2001.

The systematic structure by Ekistic Element used in the program of the Symposion is also followed in this summary.

• **Nature:** Given today's environment of concern for the way humankind is continuing to impact adversely on Nature in the city, I am surprised there were so few offerings under this element. I think we need to think seriously about the reasons for this because they may impact on our membership and the scope of our thinking. Are we clear enough about what an ekistic contribution to the "Nature in the City" debate could be? Do we think sufficiently about the contribution research into ekistic theory and practice could make to extending our reach in this element?

• **Anthropos:** The discussions we have had provide an important recognition of the spirit of the individual in city life. This has been reinforced by the fall-out from the September 11, 2001 attack on Manhattan (New York), the Pentagon (Washington, DC), and the plane crash in Pennsylvania. Where we have connected with this tragedy it has been through thoughtful challenge to the assumptions of planners and politicians concerning city building. The TV has been full of images of community in action – the interactions of individuals to overcome the losses that have affected their lives and those of their family and neighbors. We have also been reminded of the ethnic diversity within our cities and the need for us to exercise tolerance to all. From these impressions we can see the need for research which has Anthropos at the center.

• **Society:** Our discussions have reminded us of the breadth of settlements – rural through to urban; micro to macro and super-macro (the mega-city). Social sustainability has been identified as a needed focus for reference to ekistic theory and practice. Central to this is the notion of community, with more focus on micro levels and the need for our study to reflect people's perception of the spatial area we call "local community." Intersecting with these ideas is the principle of urban diffusion, connecting with the concepts in **Anthropos** (above) where the ebb and flow of diverse populations stimulates the achievement of a liveable city. Related to these ideas is the application of synergy – the whole is greater than the sum of its parts – and the fundamental notions within the Ekistic Principles articulated by C.A. Doxiadis.

• **Shells:** The models applied to our city building have been challenged, with a reminder to recognize traditional and cultural settlement models. We need to design with a recognition of the physical and the socio-economic contexts, while working with existing and new opportunities (as illustrated by the examples of Panama City and Berlin).

• **Networks:** The physical connections that underpin our concerns with Nature and Society are critical to the success of the city. We have been reminded that integration of networks is still an issue – and this means both integration of function and administration. There is also a need for balance between public and private interests. The future prospects for networks require us to carefully consider the electronic innovations so evident in the last decades of the 20th century. Electronics provides us with exciting possibilities but we also need to be aware of possible adverse consequences. The realization of potential needs for the scientists, technologists, and decision makers is to take care. A key area for improvement in our development of networks is our progress towards more effective energy systems to achieve sustainability.

• **Synthesis:** How do we answer the question "What is a successful sustainable city?" Suggestions that can be drawn from the presentations and discussion through the Symposion are:

- Define criteria to reflect the scope of ekistics;
- Recognize the importance of people as individuals;
- Balance the political/rational with the spiritual and cultural traditions;
- Shells to recognize human scale effects;
- Networks to respect the context of each Ekistic Unit (e.g. neighborhood and metropolis) and with energy reforms as a central initiative; and,
- Aim for the achievement of happiness/satisfaction through civilization.

Success of the City in the 21st Century: Identifying priorities for further WSE work

Panayis Psomopoulos

The author is an architect/town and regional planner with nearly fifty years of architectural and planning practice of which twenty years were with C.A. Doxiadis and/or Doxiadis Associates, of which he was a Vice-President until 1987. Parallel to the above he has held various posts within the non-profit Athens Technological Organization: he was Vice-President and Director of International Programs at the Athens Center of Ekistics (ACE) including the series of annual Delos Symposia and the Athens Ekistics Months. He was subsequently Director of the Graduate School of Ekistics while contributing to the research projects, and has been President of ACE since 1975. He took on the post of Acting Editor of Ekistics *in 1977 and has been Editor since 1983. He is a Founding Member and has been Secretary-General/Treasurer of the World Society for Ekistics (WSE) since 1965.*

● At a time of a world crisis, it is good that we finally managed to get together here in Berlin. We missed many colleagues who had to cancel their attendance at the last minute. But the fact that almost half of those present are new members of the Society is a great pleasure for us all.

The first meeting in the first year of a new millennium: what more natural for the WSE than to provide an opportunity for its members to think together about defining success in future human settlements and also identifying ways and means by which WSE could contribute to this success along the lines of its aims and objectives, that is to say, through

– development of knowledge;
– expansion of education;
– stimulation of worldwide interest; and
– promotion of an interdisciplinary approach,

always with regard to optimizing human life in space, and within a balanced relation between nature, anthropos, society, shells and networks.

● The subject is enormous and the time available very limited, even for a very general reconnaissance of world conditions. Nevertheless, a variety of factors made our experience exceptionally substantial and memorable. We have been exposed to statements referring to facts, trends, fears, aspirations, change and constancy, research work, theories, and examples of positive achievements at present, with emphasis on basic pre-conditions for success. Furthermore, especially rewarding was the fact that participants were particularly skilful in identifying subjects which should be endorsed by the WSE, in fulfilment of objectives such as the development of knowledge through research and a variety of other initiatives.

● My notes on priorities for future action that were suggested – directly or indirectly – at these exciting meetings are endless. Coming back to these is a first priority that I would like to propose for all of us. We have no time for that now. So let me limit myself to two points deriving from my concern to maximize results, which both relate to communication:

– discussion, and
– dissemination of information.

• **Discussion:** To be frank, I cannot pretend – and I am sure none of us could – that we had sufficient time to fully appreciate ideas and proposals. No one had a chance – due to the pressure of time – to raise questions, ask for clarifications, go deeper into the meaning of things. With the exception of the presentation on New Berlin, we were deprived of time for discussion among participants – an international group from different backgrounds, with different experiences and in different fields. Would not discussion be also a first step towards establishing connections and thereafter a starting point towards the process of interdisciplinarity? We seemed to forget that our meeting was conceived as a symposion where participants are mainly expected to exchange ideas and discuss in a leisurely atmosphere, and not as one of the usual conferences with soliloquies put on record and then in proceedings, a strictly academic practice.

Meetings are among the means that the WSE uses for direct access to knowledge. But we cannot ignore the fact that they also offer the opportunity for members to meet and establish better relations and possible options for collaboration as members of a community with special goals. Having the maximum intellectual profit with minimum sacrifice of time and energy is one of the dimensions of sustainability with which most of us at this gathering seem to be preoccupied. On any future occasion we should capitalize on discussion. We learn, we understand, we share, we connect and help ourselves to go further ahead.

• **Dissemination of information:** This concerns the members of the Society; the international community of experts who are – or should be – by definition, interested in human settlements; and the public at large.

I am sure you will all agree that we need to make every effort to revise, enrich, expand or reduce, and definitely edit all documents made available to us at these meetings and have them ready as a reminder, a basis for any future action, also with regard to educating public opinion. In the past, we in the WSE have inherited the practice of producing a brief document with the central message from each meeting. In the case of our meetings in Berlin, we did not produce such a statement. Would it not be appropriate to adopt such a policy for any future meetings of this kind?

● Under the circumstances, to conclude, in my capacity as Editor of *Ekistics,* I ask our Society to accept my proposal to consider all the material available or to be made available, and proceed with its publication in a future issue of *Ekistics.* In such a case, my problem in the immediate future is to convince you how essential your collaboration is for such an effort.

Ekistics, 415, July/August 2002
416, September/October 2002
417, November/December 2002

The 2001 Meetings of the World Society for Ekistics

IV. General Assembly

The General Assembly of members took place on Saturday, 27 October, at 17.30-19.30 hrs, on the premises of the Schleswig-Holstein Landesvertretung, through the courteous hospitality of Professor Udo E. Simonis. Professor Ekhart Hahn was unanimously voted to chair the Assembly.

Ekistics, 415, July/August 2002
416, September/October 2002
417, November/December 2002

The 2001 Meetings of the World Society for Ekistics

Farewell Dinner

Following the General Assembly, participants walked to Die Möwe restaurant for the Farewell Dinner on Saturday, 27 October, 20.00-23.00 hrs. Further to the exquisite menu, the group enjoyed the music and singing of Dr Aaron Eckstädt, courtesy of Dr Udo E. Simonis.

Ekistic grid index

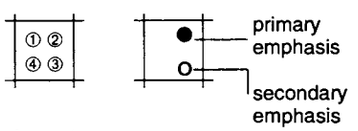
The articles in this issue are coded by the scale of settlements and an aspect of an element indicated in the ekistic grid.

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.



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

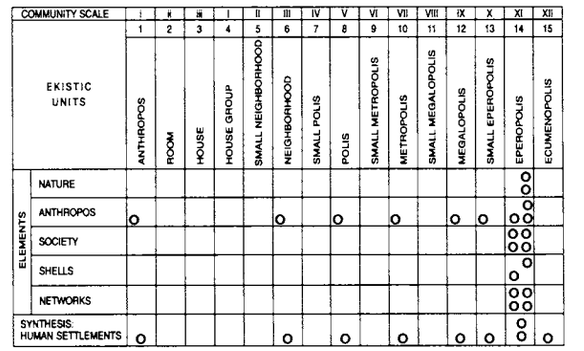
NETWORKS
1. Public Utility Systems
2. Transportation Systems
3. Personal and Mass Communication Systems
4. Computer and Information Technology

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.



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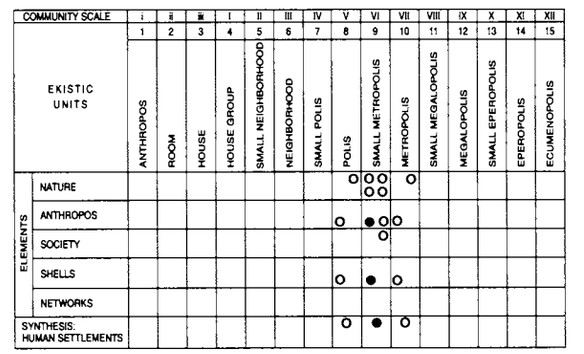
General; Present



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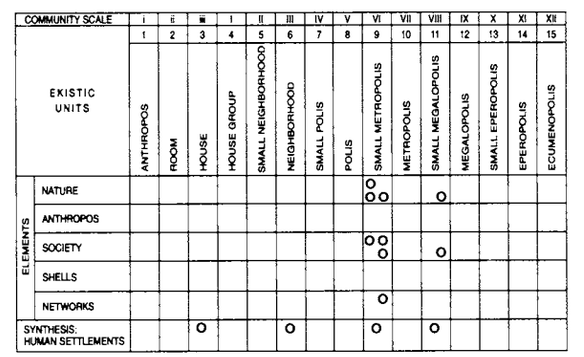

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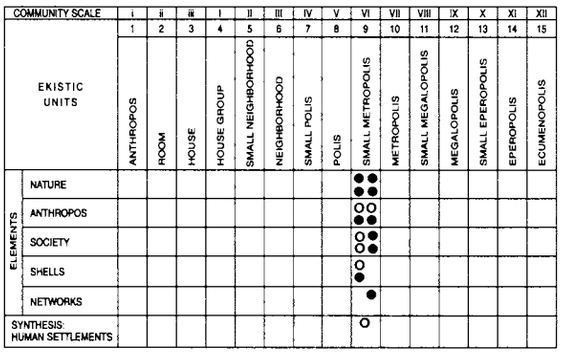
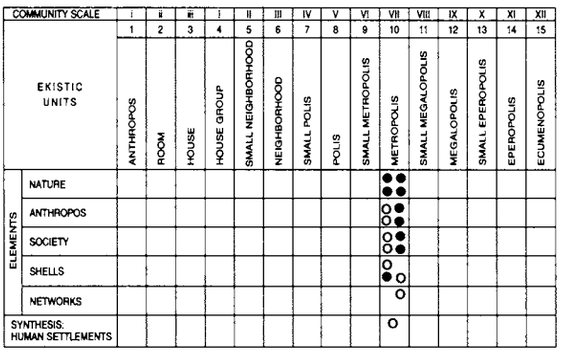


A future for the historical city of Hikone **p. 192**
Architecture, Civic Design, Culture, Conservation
Hikone, Japan; Past, present, future *D,I,M*



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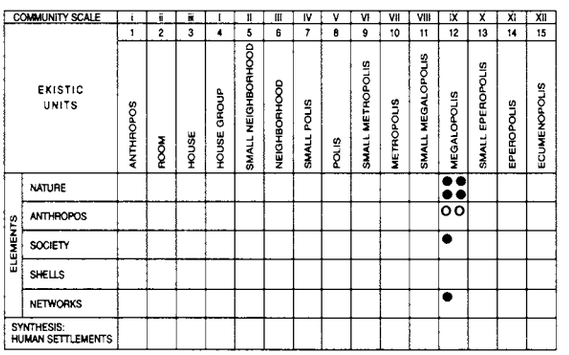

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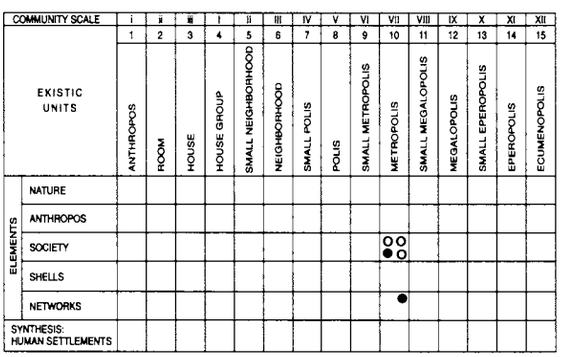

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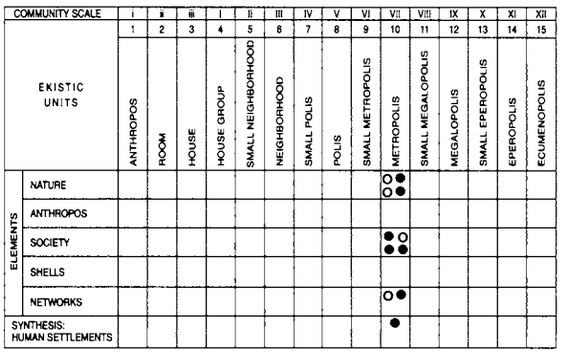

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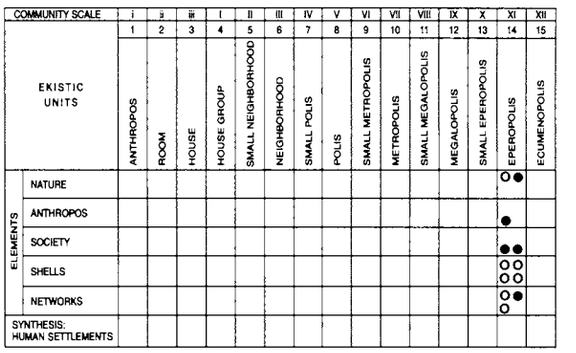

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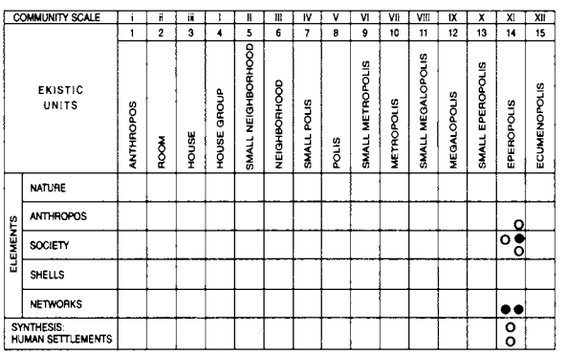

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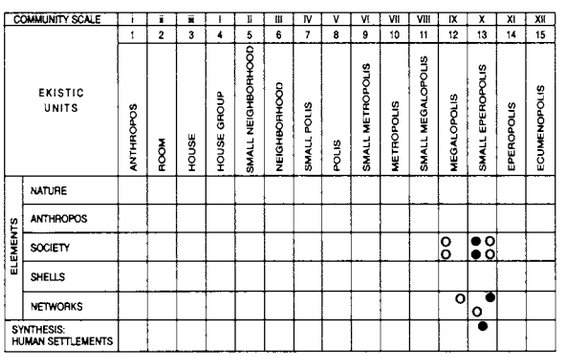

A comprehensive planning framework for the National **p. 250**
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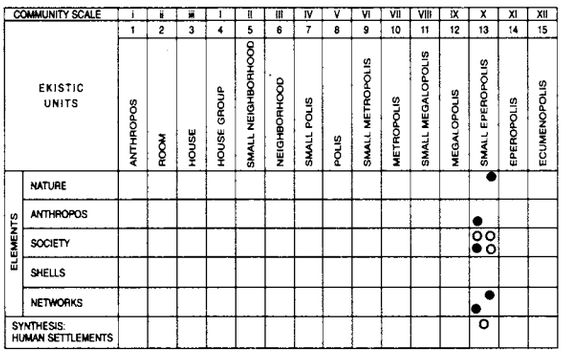

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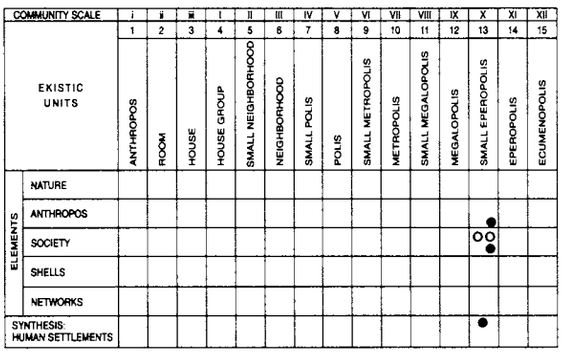

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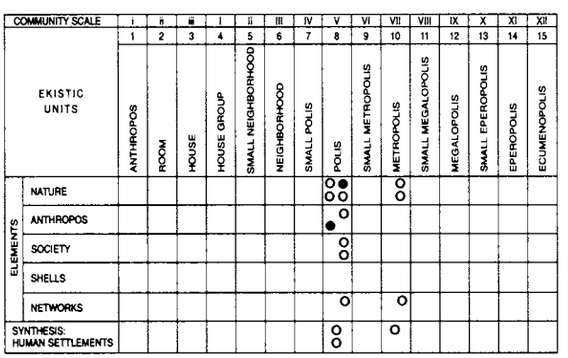

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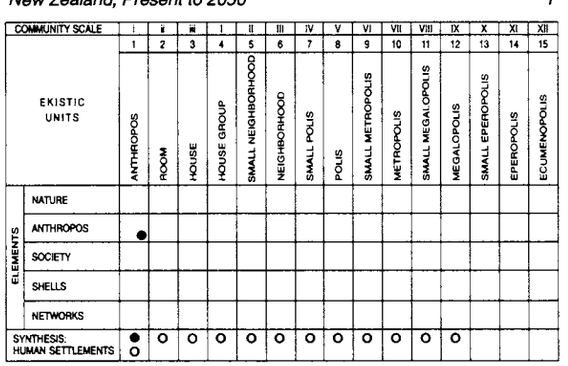

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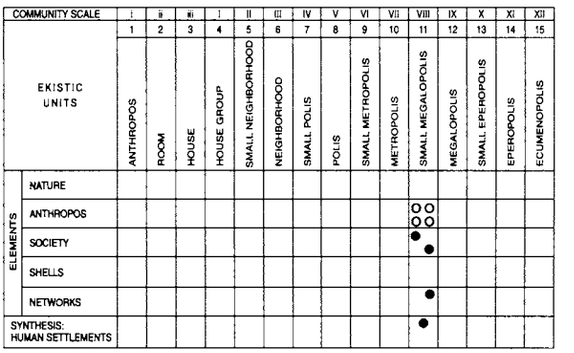

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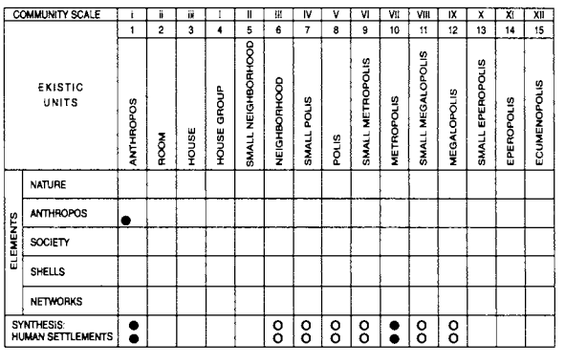

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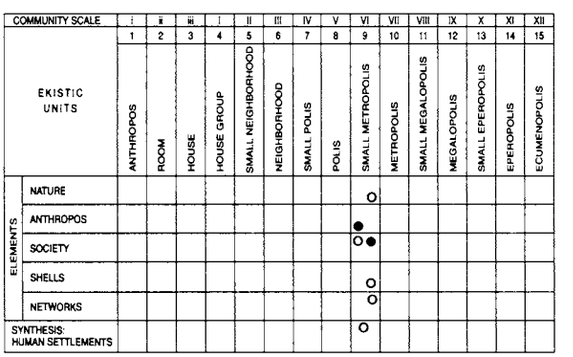

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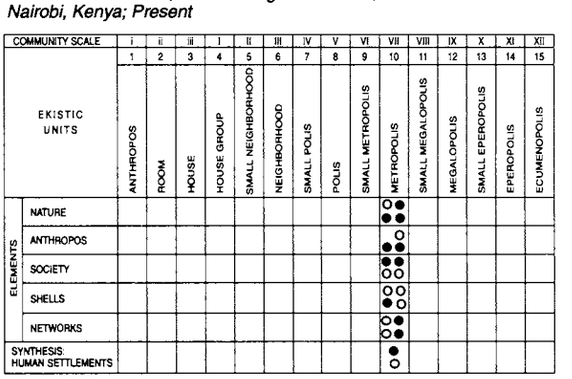

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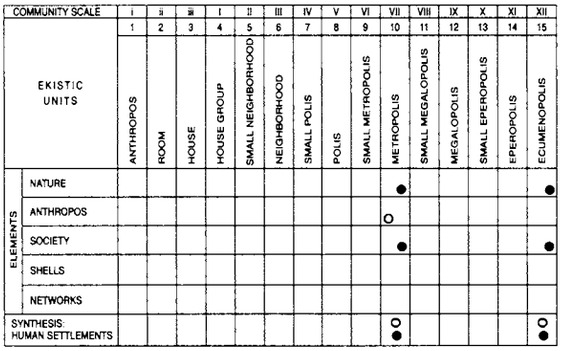

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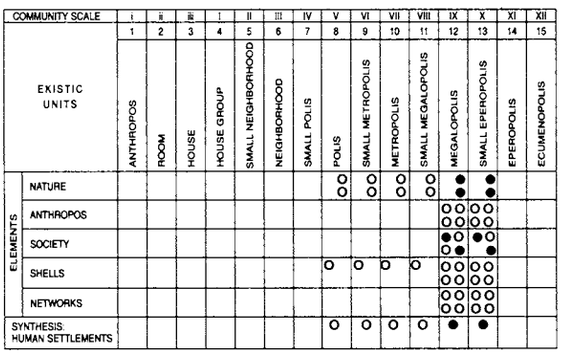

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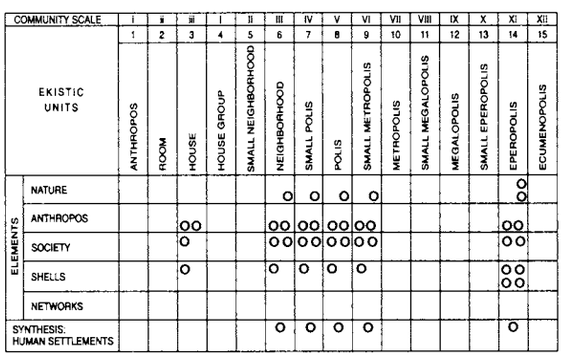

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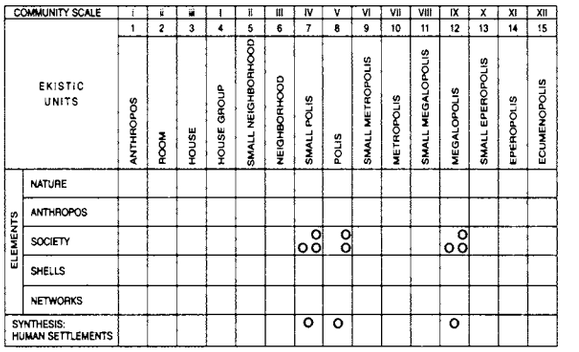

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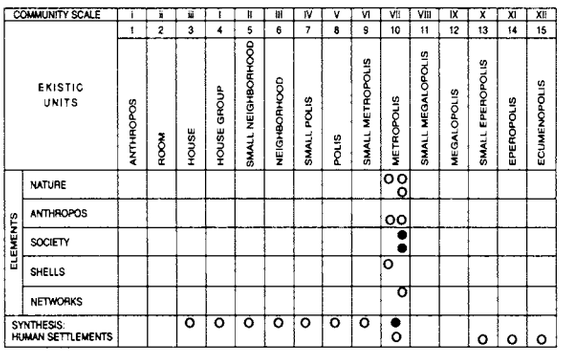

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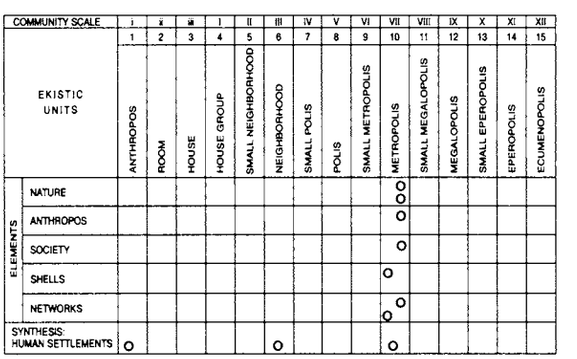

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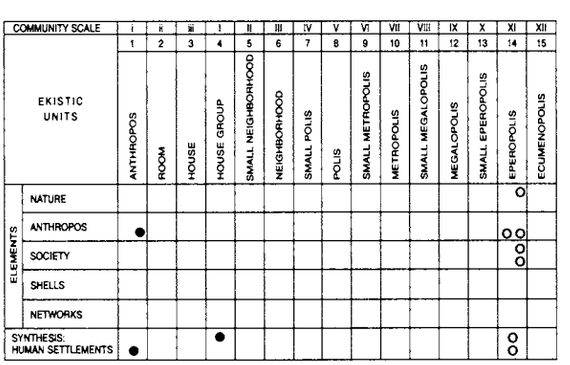

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Note

ACE : Athens Center of Ekistics
COF : "City of the Future" Research Project
COG : "Capital of Greece" Research Project
HUCO : "Human Community" Research Project

* out of print

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 *οἰκιστικός,* more particularly from the neuter plural *οἰκιστικά* (as "physics" is derived from *φυσικά,* Aristotle). The ancient Greek adjective *οἰκιστικός* meant: "concerning the foundation of a house, a habitation, a city or a colony; contributing to the settling." It was derived from the noun *οἰκιστής,* 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 *οἰκίζω,* "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 *οἰκιστική* 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).