

ECOLOGICAL URBAN RESTRUCTURING

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There is a way back from the concrete jungle to a green world. It requires both social and technical steps-both planning and invention.

Lewis Mumford

The ecological dead-end of city planning

The greenhouse effect, the damage to the ozone layer, the decrease in biodiversity, and the increase of hazardous wastes and other global environmental problems are directly related to the development of industrial society and modern urban structures. Cities are notorious for their careless treatment of scarce and vulnerable environmental goods. The process of transforming raw materials into waste and pollutants has become autonomous, while urban planning ignores significant elements of human behavior, giving rise to grave socio-psychological problems. Cities have thus become a symbol for the neglect of organic, cultural traditions and the destruction of the identity of places.

The prevalent type of industrial urban development is a dead-end street, as is demonstrated by the highly urbanized industrial countries. With less than a quarter of the world's population, they consume more than 70% of the world's primary energy and almost 80% of the raw materials. Above all, this is due to the development of urban technology, of infrastructures, and forms of consumption, characterized by a linear optimization of individual systems and the separation of correlated urban functions, i.e. working, living, and leisure are increasingly separated, as are the patterns of production and consumption.

Together with the spread of global markets for raw materials, the production and the consumption of products have also drifted further apart so that the economy concentrates less and less on local factors. A gigantic rise in transport requirements and traffic capacity is associated with this process, as is a rise in emissions. Presently, traffic accounts for approximately 20% of global CO₂ emissions, about 48% of NO_x emissions and about 75% of carbon monoxide emissions.

Almost half of most industrial countries' and energy consumption goes to heating. This is predominantly due to modern building methods which ignore findings on heat conservation and energy efficiency. In the hitherto socialist countries of Eastern Europe the squandering of energy is even more spectacular. For decades the societal framework for dealing with energy and heating has systematically worked against environmentally conscious attitudes. The example of the "Sears Tower" in Chicago, for many still a shining symbol of modern city planning, demonstrates that aberrations of this sort of technical development can take on broad dimensions; this urban monster uses more energy in 24 hours than an average American city of 150,000 inhabitants or an Indian city of more than 1 million inhabitants.

Grave ecological consequences result from a decade-long, irresponsible approach to land use in modern city planning. For instance, in the large cities of Europe the settlement surface per inhabitant has increased 10 times in the last 100 years. This staggering surface corrosion is due above all to the idea of the "car-oriented city", the development of surface-extensive facilities and the separation of urban functions.

The deterioration in the urban quality of life concerns not only bad quality of air and drinking water, or the increase in poisons used for interior finishing, but also the impoverishment of sensual perceptions and the loss of orientation and identification on the part of the inhabitants. Doctors and psychologists speak of our cities as the "expression of a sick landscape of the soul", in which the atrophy of the inner world takes place parallel to the destruction of the outer environment.

From an economic point of view, this type of urban and settlement structure also turns out to be a dead-end. According to studies of the Federal Environmental Agency, the costs of environmental destruction (=calculable damages) in the Federal Republic of Germany in 1986 amounted to over DM 103 billion or 6% of the GNP, and what is more, these costs are increasing exponentially.

Modern urban lifestyles

In spite of these imbalances and alarming trends, the attractiveness of cities continues to increase. It is therefore necessary to clarify the question of what constitutes this attractiveness of cities.

City life means concentration and variety, the co-existence of people of different descent and lifestyles. The fascination of cities is contained in their heterogeneity and diversity, in their strangeness and familiarity, in problems and opportunities.

Moreover, cities have always been an expression of the "triumph of man over nature", of the felt need for liberation from the tight bonds and commitments to nature and the environment. Industrial modes of production created totally novel and enticing possibilities. The desire for independence and freedom from commitment and personal responsibility for nature and the environment materializes in modern construction and urban planning. To a degree hitherto unknown, the individual is independent from daylight and weather, from seasons and local raw materials, as well as from the natural cycles of regeneration.

For the individual this means not having to worry about many routines. Electricity comes from a plug; water comes from water taps and disappears down the drain; waste goes into a garbage pail and one hasn't to bother what happens before or after that; milk and bread are to be bought at the supermarket; children are brought to nursery schools, sick people to hospitals, older people to homes for the elderly. We need not care for the buildings and neighbourhoods since janitors, building societies and public institutions are responsible for that. The increase in free time leads to the "flight into remoteness", to modern mass tourism and other forms of leisure consumption. Only now people seem to realize that these developments also lead to a loss of functionality and attractiveness of intimate urban space, to a functionally divided, car-oriented, not man-oriented city.

The ecological challenge with which industrial society is confronted is thus not only a question of technology, but above all a question of lifestyles and societal values. In this respect we need innovations and ecologically sound solutions to problems in civilization. History has shown that such solutions may be found, given the will to survive, just because of the innovative power of cities. In this sense, there is a legitimate chance that the topic of ecological adaptation of industrial urban culture will be incorporated into this historical chain and resolved creatively.

Ecological Urban Restructuring

The role of ecological urban restructuring in mitigating or solving the environmental crisis is based on the fact that cities represent the most materialized form of a society's interaction with the natural environment. The city is "built thought"; it is both a product and a producing-reproducing-modality in the metabolic process between society and nature. Thus the city is the central point of departure as well as the central place of further development of society's appropriation of natural resources, of the transformation of technology, of societal innovations and cultural change. Urbanization will continue on a global scale. Decisive impulses to mitigate or to solve the concomitant environmental crisis therefore must come from the city.

It is difficult to consider ecological urban restructuring from an exclusively theoretical point of view. Any promising solution needs a close connection between theory and practice, as well as the cooperation of various disciplines, of major agents and the general public. New planning procedures and new technologies must be developed and tested in real urban situations and gradually made operational in order to achieve a new context step by step.

Already with presently available technology and organizational measures, it is possible to drastically reduce emissions, save resources and ease the burden on the environment. Experts commissioned by the Berlin Minister for Urban Development and Environment Protection discovered for instance, that 50% to 60% of current space heating energy could be saved in less than 30 years. The related reduction of harmful emissions would be about 70%. As for the measures to be implemented, the following suggestions were made: application of passive thermic protection in buildings, extensive conversion to gas, using heating from power-heat co-generation. Energy consumption and harmful emissions could be reduced further by measures such as thermic recovery, temporary thermic protection, introducing buffer zones and active use of solar energy.

Regarding water, it was demonstrated that more than 20% of drinking water could be economized with an investment in water-saving technology and with a pay-off period of only a year or so. By introducing technology for re-using grey water for toilet flushing and by decentralized utilization of rainwater, savings of up to 50% are possible. Pre-cleaned rainwater (or even grey water) could be used for the irrigation of roofs and facades, and thereby for improving the urban micro-climate. It was found that such concepts can both alleviate the problems of water scarcity and of water pollution.

Moreover, evidence was established that by covering unused surfaces such as courtyards, roofs and facades with vegetation, the ecologically active, "green" surfaces in cities can be increased 10 times. Considerable amounts of dust and pollutants could thus be absorbed by plants. Local temperatures in built-up areas could be significantly lowered, and the oxygen and humidity content of the air could be increased. Noise emissions could partly be absorbed by soft, porous facades and greened roofs. The urban population could even become partly self-sufficient

with herbs, lettuce and vegetables from rooftop greenhouses. A further significant effect of the "greening" of houses and courtyards could be a change in the inhabitants' behaviour in their free time and the corresponding reduction of traffic.

As a last example, let us turn to garbage. Already in the late 70's it was shown that so-called "waste" actually is "valuable material". In the average Berlin three-person household some 810 kilograms of "waste" are produced per year. About 615 kilograms of this could be re-used in principle. Even if only 50% were re-used, the reduction of waste for a city like Berlin with about 3 million inhabitants would be in the range of 1.2 million tons per year. The following reduction measures were suggested: avoidance of waste, separate collection of materials and waste (glass, paper, organic and chemical substances, metal, residues), compost piles for organic waste, establishing recycling stations.

There have been a number of reports documenting that ecologically motivated transformation is possible in all branches and sectors of the economy. Unfortunately, very little of this knowledge has been disseminated and put into practice. "Environmental relief" provided by the introduction of catalytic converters into the cars has been more than compensated for the extension of the street system and the use of larger cars with additional horsepower. Rather than a reduction of waste, a quantitative rise can be noted in most cities, as well as an increase in polluting substances. Even the perfectly plausible concepts of water saving and urban greening were largely ignored.

Elements of a strategy for Ecological Urban Restructuring

As a reaction to the failures of urban environmental management, a close linking of inter-disciplinary and cross-referenced theory and implementation of pilot projects seems to be a prerequisite. Also it seems necessary to foster the understanding of ecological urban restructuring as an international task.

The following proposals are the outcome of such an inter-disciplinary, empirically and internationally oriented project undertaken at the Science Center Berlin, with financial support by the Volkswagen Foundation. The partners were the URBION Institute in Bratislava (Czechoslovakia), and the Polytechnicum in Cracow (Poland). The aim of the project was to compare the environmental situation and the strategies of action for urban ecology, depending on the specific socio-political frameworks. In addition, the research project was supposed to suggest political strategies and planning concepts for a better understanding of the urban environment. One of the results of the project was the concept of "ecological urban restructuring". It is composed of three essential elements:

- A. The "Eight Points of Orientation" which serve as a guideline and as a basis for discussion on specific projects as well as suitable political strategies and individual measures.
- B. The "Fields of Action" and "Building Blocks" with which the possibilities of and necessities for ecological urban restructuring are being systematized; they represent an aid for thought and work when dealing with the contradictions between existing sectoral planning and the necessity of new 'integrated' thought and action.
- C. The "Concept of Ecological Neighbourhood Development". Neighbourhoods that are comprehensible for their inhabitants have been discovered to be the most important level of action for ecological urban restructuring. Multiple possibilities towards networking individual measures to integrated concepts with the participation of the inhabitants and other local actors are offered here. Through decentralized local networking, individual measures become ecologically effective, economically viable, and socially acceptable.

"Eight Points of Orientation"

The "Eight Points of Orientation" were formulated out of the necessity of introducing comprehensible guidelines on ecologically compatible urban planning. Explanatory aids as to what is to be understood by "ecological urban restructuring" are hardly available. Institutions and actors are badly prepared for a topic which, no doubt, will be a central one in the future. The theoretical assumptions and the empirical findings from the research project on central ecological urban restructuring are summarized in Figure 1.

It is in no way imperative that totally new criteria for thought and action be used to reform the interactions between society and environment. Rather, principles of environmentally and socially compatible technology and forms of settlement, verified by centuries of experience, should be systematized.

- A. Human-ethological orientation: If we do not have a better understanding of the "nature in us", no solutions for the "nature around us" can arise. It is to be noted that we carry the traces of thousands of years of evolution in the natural milieu and in small, social units. Specific behavioural patterns emerge from this, which modern urban planning often disregards. Human-ethological planning criteria comprise the human being's need for individual space and group territory; its search for identity and self-representation; its demand for orientation and social structures.
- B. Participation and democratization: Participation of the inhabitants is the first "ecological law"! The re-education of city inhabitants to mere consumers and considering them only as incompetent recipients of services was a social and ecological dead-end. Personal participation, experience and responsibility in the interaction with the environment will instigate positive learning processes. Decentralisation in planning, in the design and implementation of the local habitat leads to spaces for individual and collective awareness and self-realization.

- C. Orientation to cycles and networks: Nature is the most economical and ecological architect. Its products are harmoniously placed into energetic and material cycles, optimally adapted to local conditions. Builders, architects and city planners should again learn from "nature's intelligence". When choosing building materials and designing products it is important to consider the whole production, consumption and deposition cycle and its effects on people and the environment (chain or tree concept). Corresponding "substance-value factors" should be integrated into all planning activities.
- D. Orientation to nature and the senses: It is not enough to understand cyclical orientation and participation in purely organizational or technical terms. People must be enabled to again experience them personally. Since most of the natural and cyclical relations of architecture, urban planning and technical systems can no longer be experienced sensually, sensitivity and responsibility wither away and indifference as to what is bad and good in life rises. For example, water in the city just occurs between the tap and the drain, and one does not bother about what happens before and after. Under such circumstances the esteem for this vital element must atrophy.
- E. Orientation to qualified density: Ecological urban restructuring implies integration of urban functions, a creative mix of residential, work and leisure activities on the smallest possible scale (qualified density). This means the realization of multiple alternatives for cooperation, and of the respective possibilities for saving time, distance and resources.
- F. Orientation to the "Genius Loci": The Chinese doctrine of "Feng Shui" stipulated a way of constructing buildings and cities, of utilizing land and natural resources "that the landscape was not changed in such a way that the earth's life-supporting energetical influences and operating laws would be disturbed." Today, orientation to the "genius loci" means to relate architecture and urban planning to the history of a given place. Reference to the "genius loci" thus is visualizing the city and the urban neighbourhoods as living memory.
- G. Ecology and Economy: So far, environmental protection policies have neither proven sufficient nor financially viable. Instead of treating symptoms, we must develop preventive ecological strategies which strike at the anthropological origins of the environmental problems. New, innovative instruments like resource taxes, emission charges, billing according to consumption, environmental accounting, appropriate building standards, planning laws and strategic subsidies have to be introduced. Furthermore, it is necessary to create suitable conditions for new forms of co-operation between the formal and the informal economy, towards co-planning, co-production and co-responsibility in forming the local habitats.
- H. International orientation: Local and global environmental problems, the destruction of the resource basis in the developing countries and the waste of resources in the industrial countries are closely linked. Ecological urban restructuring thus requires an international exchange of knowledge and experience, and the mutual support in implementing new urban ecological strategies. Important impulses for environmental policy originate from decentralized municipal networks, a new kind of pressure "from below". Suggestions to finance such programmes "help for self-help" are on hand; funds hitherto used for armaments may be channelled to this type of activity.

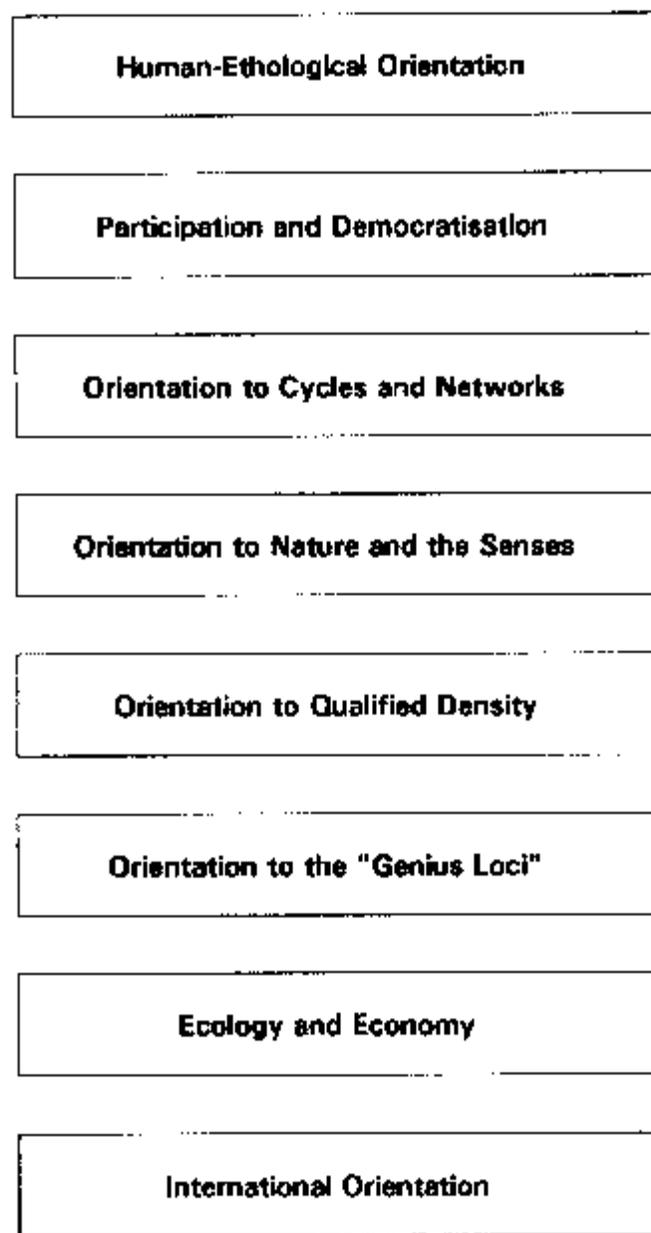


Figure 1: Eight points of Orientation for Ecological Urban Transformation

"Fields of Action" and "Building Blocks"

The question is, how can the proposed "points of orientation" be made more specific and put into practice. On basis of the theoretical foundation presented and of experiences from pilot projects on ecological restructuring, the "fields of action" and "building blocks" were formulated. They try to mediate between the reality of sectoral planning, of existing policy and administrative departments and the necessity of "integrated" thought and action. Three fields of action which complement each other have turned out to be particularly important for integrated ecological urban restructuring:

- A. Urban Technology and Urban Design
- B. Grass-root Democracy and Environmental Communication
- C. Urban Economy and Political Administration

Only by networking these three fields of action does ecological urban restructuring have a good chance. If not, things will remain at a stage of rather exotic and only partly convincing pilot projects. Particularly the second and third fields of action indicate the importance of changes on a new collective environmental consciousness, a new environmental ethic.

With respect to the interdisciplinary and international project quoted above, the three fields of action were defined and made more specific by a number of "building blocks" (see Figure 2.)

These building blocks relate to established and new planning areas, policies, instruments and research proposals which are of particular importance to ecological urban restructuring. A variety of dialogue partners can be addressed (persons, institutions and associations) concerning the implementation of strategies; tasks can be formulated, obstacles to their realization can be identified, agreements about solutions reached, and final implementation begun.

The term "building block" should illustrate that the function and capacity of each building block becomes effective only in conjunction with the other building blocks. In its ecological, economic and social efficiency it has only a limited chance of implementation without this networking. This does not mean, however, that all building blocks should necessarily be taken into account when planning and realizing concrete projects. Rather, the building block model is a framework; it serves to recognize the suitable approaches for action, given the specific situation of a project, and to allow use of locally given possibilities.

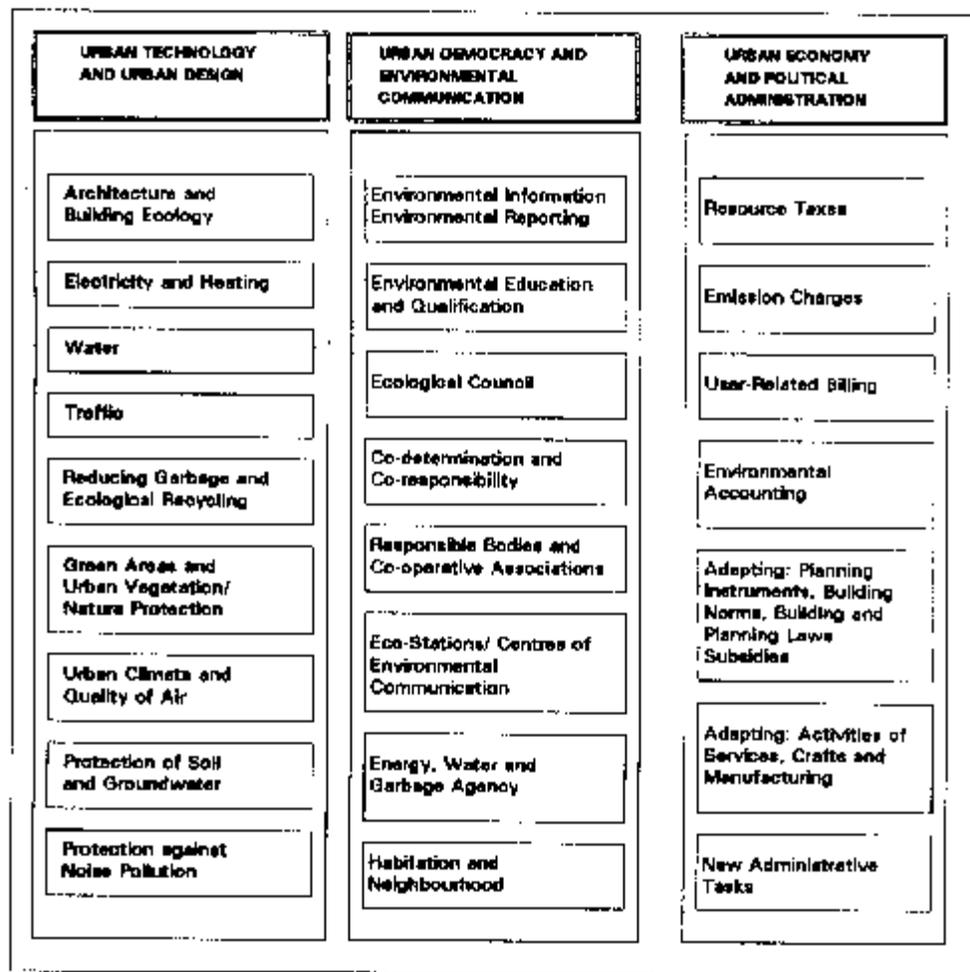


Figure 2: 'Fields of Action' and 'Building Blocks'.

As to urban technology and design it has proven useful to distinguish four levels of innovation (see Figure 3). They demonstrate historical levels of technology, as well as the direction for the further development of environmental technology. Only the fourth level of innovation can really be acknowledged as being "ecological". Nevertheless, related to a particular problem in a particular place and time, all four levels of innovation can be the best solution, i.e. the only possible one.

It is necessary to combine technical measures with environmentally oriented communication, and to introduce democratic participation and co-responsibility of the inhabitants from the very beginning of planning. Education and technical assistance play an important role here. "Environmental shops and stations" should be established as centers of environmental information and communication.

Level of Innovation	Symbol	Description
1		Measures according to the "High Chimney Principle"
2		Measures of Technical Treatment After the Fact
3		Measures of Technical Prevention and Problem Avoidance
4		Preventive Techniques and Concepts with Socio-Ecological Principles of Design

Figure 3: Four Levels of Innovation of Environmental Technology and Technical Concepts for Urban Development.

With regard to the measures of environmental communication it is important to include local bodies such as churches, youth organizations, clubs, etc. as multipliers in such a process, but also to reactivate untapped resources of the existing administration. Thus, according to given local conditions, an attempt can be made to incorporate schools, nurseries, health and cultural institutions into the urban planning process. Citizens' initiatives, self-managed projects which already exist and whose work can be fostered are very important when implementing a neighbourhood-related programme to reduce solid waste, to recycle materials, to compost organic waste and to promote environmental communication in the way described.

Ecological urban restructuring can and must also be understood as an economic strategy of creating additional employment and developing new professional capabilities. In energy and water conservation, in optimizing transport, or in urban greening, many new employers will emerge, particularly as professional opportunities arise. All these activities are relatively labour-intensive; ecological restructuring thus can become a positive employment programme.

However, additional employment and new professional capabilities on the city and neighbourhood levels are strongly dependent on administrative innovations on the national level. New environmental policy instruments, like resource taxes, emission charges, new accounting procedures, and the adaptation of planning instruments and planning law all fall into the competence of the national government, some new policies (taxes and charges) even need approval on the international (European) level. The discussion concerning this new environmental policy framework for economic activities is well advanced, the implementation of the respective proposals, however, is lagging behind.

"Concept of Ecological Neighbourhood Development"

Urban neighbourhoods, especially areas for multiple uses (living, working, leisure, shopping) are particularly suitable for successful ecological urban restructuring; four characteristics of neighbourhoods (see Figure 4) are important in this respect.

- A. The neighbourhood as a defined area of several blocks, with the streets and open spaces belonging to it, is an entity of people and its group territory, which they are familiar with. As a "human habitat" it features daily experiences, attitudes and actions, and consequently has a telling influence on the individual's well-being.
- B. The severity of environmental problems but also the potential for solutions are recognizably best from the intimate acquaintance with one's own habitat. On the neighbourhood level, the environment and the living conditions are influenced by the environmental effects of business, of emitting power plants, of residues which pollute the water, of leisure areas, of traffic noise, and garbage generation.
- C. Since the state and other central institutions have failed to provide and secure acceptable living and environmental conditions, they are confronted by local communities not willing to accept these and fighting for their right to sound living conditions. Increasingly, inhabitants are prepared to invest ideas, time and money for their local habitat.
- D. Thanks to increasing environmental information through the press, television, literature and experts living in the area, the citizens of a neighbourhood learn about the specific problems and about realistic solutions for them. Urban neighbourhoods have a certain potential of resources at their disposal which can be activated under suitable conditions in order to promote ecological urban restructuring.

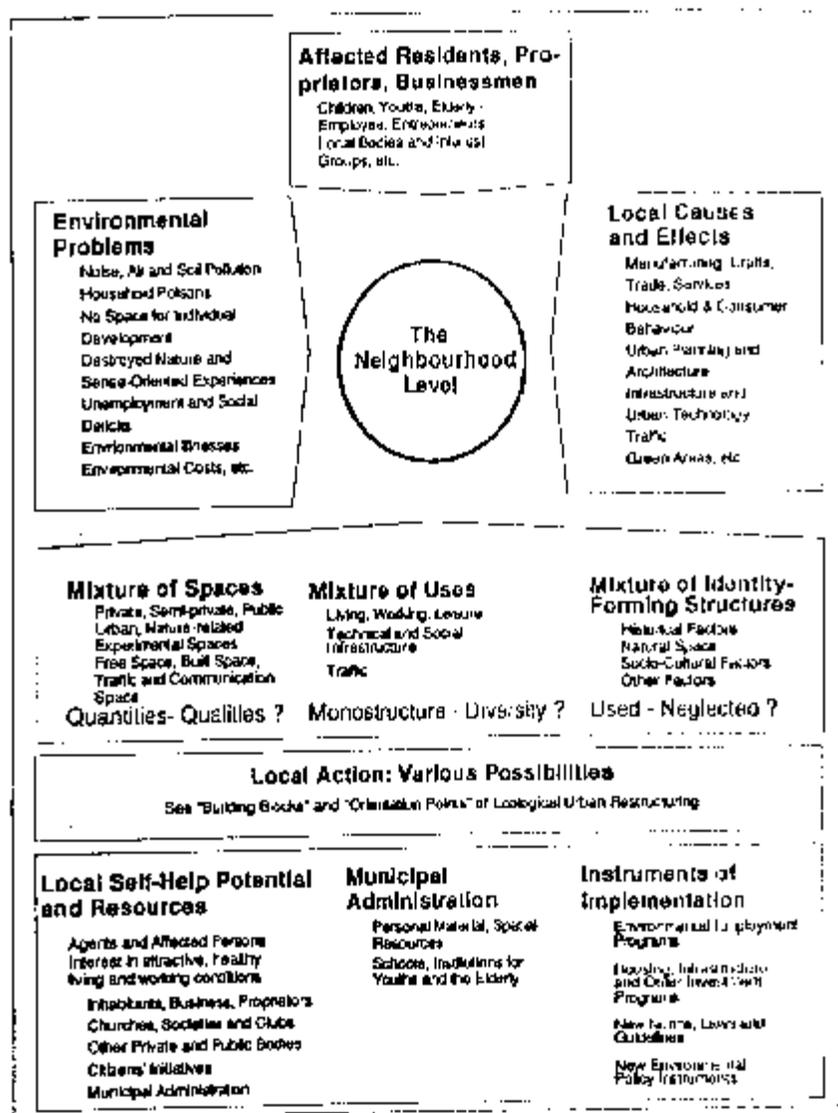


Figure 4: Interactive Space for Living, Building and Design

Initiatives of international organizations

The importance of ecological orientation of urban technology and design has been recognized by almost all large international organizations. Resolutions have been passed, research projects were initiated; policy recommendations were given and guidelines for national urban policies were developed. Some examples:

The topic of Urban Ecology has been discussed by the European Economic Community (EEC) in its "Fourth Environmental Action Programme" (1987-1992). This programme deals with the contents and goals to be set, with recommending policies and with support programmes for urban initiatives and projects within the EEC. The support programmes concentrate on sectoral research topics, with projects on energy, water, traffic, waste, noise protection, etc. In June 1990, the "Green Charter for Urban Planning" was passed. In this charter, the economic importance of an ecological recovery of the European cities is stressed and objectives and areas of action are made more specific. Particularly, a connection is postulated between urban environmental programmes and employment, and a plea is made for integrated, inter-departmental concepts of urban ecology.

Since the beginning of 1989, the OECD runs a programme on "The Role of Cities in Sustainable Development". Three focal points have been designated for the years 1991 to 1994: 1. "Cities and Economic Development", 2. "Cities and Social Development" and 3. "Cities and the Environment". Parallel to this, the "Urban Observatory Programme" is to be conducted, which is concerned with environmental reporting and information systems and improving the data basis for the "Sustainable Development of Cities". The programmes shall also examine the urban environmental problems of non-member states, especially those of Eastern Europe.

Since 1988 the World Health Organization (WHO) runs the "Healthy City Project". The objective of this project is defined as: "A healthy city is one that is continually creating and improving those physical and social environments and expanding those community resources which enable people to mutually support each other in performing all the functions of life and in developing to their maximum potential."

Cities worldwide were requested by WHO to participate in the establishment of an "International Healthy City Network". In the meantime, about 400 cities from more than 25 countries participate in the project.

UNESCO can be considered to belong to the avant-garde on urban ecology. In 1975 an expert group was convened on the topic of "Integrated Ecological Studies on Human Settlements" in the "Man and Biosphere (MAB)" programme. Ten years later the project on "Urbanization and Environmental Change" was initiated in cooperation with ICSU (International Council of Scientific Unions) and IFIAS (International Federation of Institutes for Advanced Study). Case studies on urban ecology in various regions of the worlds have been carried out, and seminars and conferences were organized.

The Economic Commission for Europe (ECE) has decided that the main topic of a conference in 1992 will be "Urban Ecology". In 1990 a research colloquium was held on "City Ecology which served to provide the "state of the art" on this topic.

Also new international organizations concerned with this topic are being founded, as the "European Academy of the Urban Environment", in Berlin, and the "International Secretariat for Local Environmental Initiatives" in New York, which are thought to promote local environmental initiatives in Europe and worldwide.

These examples illustrate that apart from the necessity of local action, the importance of international cooperation for ecological urban restructuring has, in fact, been recognized.

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