European sustainable cities: the challenge of citylife: being exposed to an air polluted urban environment

Prof dr. R.A.F. Smook

Delft University of Technology, Faculty of Civil Engineering, Department of Building and Construction Management, Section Design and Construct Management,
Stevinweg 1, 2628 CN Delft, The Netherlands

1. AIR POLLUTION AND THE COMPREHENSIVE APPROACH

1.1. "Stadtluft macht Frei" is not quite true in our days

The city is a dangerous place to live in, because of the very complex pattern of environmental threats. Finding ways to reduce $C0_2$ emission can be a goal, but this achievement has to be imbedded in a more comprehensive concern about the environment.

1.2. The complexity of the problem makes a comprehensive approach necessary

The well-known slogan "Think globally, act locally" is very much true in matters of fighting air pollution.
The slogan specifically for the attitude towards the urban environment could be: "Think comprehensively, act sectorially". This with trying to improve the environment and also the air environment step by step. The slogan is hopefully followed by: "Plan globally, implement locally".

1.3. EU involvement in air pollution

Being here invited as one of the chairmen of the EU Expert Group on the Urban Environment I like to tell something about the work we just completed and to show something about the relation with the topic at stake in this workshop.

The Sustainable Cities (Policy) Report is prepared by the EU Expert Group on the Urban Environment. The Report rounds off a four year period of work. The presentation of the Report took place on a conference on Sustainable Cities in Lisbon, Portugal, September 1996. To show the attitude the EU chooses herewith I present the chapter arrangement in the Report:

1.4. Chapters of the (Policy) Report:

Positive Context for Sustainable Cities;
Sustainable Urban Management;
Sustainable Management of Natural Resources, Energy and Waste;
Socio-economic aspects of Sustainability;
Sustainable Accessibility;
Sustainable Spatial Planning;
Conclusion and Recommendations.

1.5. Comprehensive approach

The problem of environmental pollution of urban entities is studied following the categorization reflected in the chapter arrangement. It is clearly identified that all aspects are close coherent and very much interdependent.

The interdependency has to be understood, the comprehensive approach has to be followed, a sectorial strategy has to be defined.

1.6. The main problems to be identified

Cultural defined lack of awareness;
Fixation on economic growth, that causes $C0_2$ production;
Poor investment in waste disposal;
Over-estimation of mobility needs, in order to achieve $C0_2$ reduction;

Lack of willingness to cooperate.
Lack of performance of integrated policy making and management systems.

1.6.1. Cultural defined lack of awareness

All that goes wrong is due to the fact that we do not understand the real already existing situation and take the attitude that our generation, in our living environment will not be confronted with the ultimate failure of the system (selfishness).

1.6.2. Fixation on economic growth

The Report states very clearly that only an other attitude can bring about results. Mankind only can survive with an annual addition to our already outrageous style of living. The economic system is build on this principle.
Economic growth goes hand in hand with more pressure on the eco-system.

1.6.3. Poor investment in waste disposal

Looking back at the urban history in Europe we can evaluate that for instance sewerage systems were only introduced half a millennium after city life organized itself. It takes years before we are used to the idea that we have to deal properly with the waste we produce and invest in waste disposal on before hand.
This extra investment has to be balanced out against the economic growth.

1.6.4. Over-estimation of mobility needs

In terms of air pollution mobility seems to be a key issue. As long as a certain over-estimation of mobility needs is considered as being "quite harmless" very little progress can be made in the field of improvement of the urban environment.
In passenger and goods transportation we are used to an unsustainable level of quantity and quality. "Freedom of movement" is a commodity we can no longer afford. This is perhaps a key issue in the improvement of the air quality in cities.

1.6.5. Lack of willingness to cooperate

Since our choking in pollution is a shared and international phenomena it has to be

understood that we have to refrain from our unwillingness to cooperate over national, cultural, sectorial and even personal borders.

1.6.6. Lack of performance of integrated policy making and management systems

Policy making in the field of environment is fragmented. The town planning and urban management instrument is underdeveloped and unfortunately so is the usage of the instrument. Problems can only be solved in the framework of comprehensive urban and regional planning: "Planned globally, implemented locally".

1.7. Four key principles and ways for problem solving are identified in the Urban Environment Expert Group Report:

1. Management; Get it organized in the best way.
2. Integration; See the cohesion of problems and solutions.
3. Ecosystems thinking; Understand that the environment is a system.
4. Cooperation; Work together in order to survive.

2. SOME CONCLUSIONS IN RESPECT TO AIR POLLUTION OF THE SUSTAINABLE CITIES REPORT 1996

2.1. Introduction

2.1.1. General approach of the problem of air pollution

The Sustainable Cities Report looks at the problem of air pollution as one of the major problems to be solved in improving the urban environment. The Report states that the problem can only be solved in the context of other important aspects of the urban environment. It identifies necessary linkages to aspects as economic growth, spatial planning in general and mobility.

Within the European context already lots of regulations and directives are in force. All of them aim at reduction of emission levels and "coordination" of legislation in this field in member states.

2.1.2. Management

The policy report of the Sustainable Cities Project is intended as a contribution, on the part of the Urban Environment Expert Group, to the growing debate about cities and sustainability in Europe. It draws together a wide range of thinking and practical experience in addressing questions of urban management for sustainability. Despite a growing raft of legislation, directives and regulations, European cities continue to face economic and social problems and environmental degradation. New ways of managing the urban environment need to be found so that European cities can both solve local problems and contribute to regional and global sustainability.

2.1.3. Diversity of cities

The report recognizes and celebrates the diversity of European cities. Clearly the legal and organizational basis for urban environmental action varies between Member States, in part reflecting differences in the responsibilities assigned to different tiers of local government. In addition, cities differ in their geographical circumstances and city administrations vary in terms of the sophistication of local responses, processes and techniques. Approaches to sustainable development are likely to be different in different cities.

2.1.4. Exchange of experience

The report, therefore, does not suggest blanket solutions or recipes for all cities. Instead it advocates the provision of supportive frameworks within which cities can explore innovative approaches appropriate to their local circumstances, capitalising on traditions of local democracy, good management and professional expertise. Whatever their responsibilities and competencies, local governments throughout Europe, through the many and varied roles which they perform, are now in a strong position to advance the goals of sustainability.

2.1.5. Addressing wider audience

The report and its conclusions are aimed at a wide audience. For whilst elected representatives in cities, city managers/administrators and urban environment

professionals have key roles to play in sustainable urban management, successful progress depends upon the active involvement of local communities and the creation of partnerships with the private and voluntary sectors within the context of strong and supportive government frameworks at all levels. Political leadership and commitment are critical if progress is to be made.

The remainder of this part describes the principal approaches advocated in the report, makes conclusions and recommendations for policy, practice and research and sets out a continuing agenda for the Urban Environment Expert Group.

2.2. Issues of key concern

The report envisages the sustainable city in process terms rather than as an end point. Accordingly, it highlights policy processes as well as policy content. Both emphases are significant when it comes to the transfer of good practice from one locality to another. The city is seen as a complex system requiring a set of tools which can be applied in a range of settings. Although the system is complex, it is appropriate to seek simple solutions which solve more than one problem at a time, or several solutions that can be used in combination.

Four key principles underlie the solutions advocated in the report, and should form the basis for sustainable urban management, as follows:

1. Management:
2. Integration;
3. Ecosystems thinking;
4. Cooperation.

2.3. Management

2.3.1. The need of putting sustainability on the agenda

Sustainable development will only happen if it is explicitly planned for. Market forces or other unconscious and undirected phenomena cannot solve the serious problems of sustainability. Agenda 21 specifies a thorough process of considering a wide range of issues together, making explicit decisions about priorities, and creating long term

frameworks of control, incentives and motivation, combined with quantitative, dated targets in order to achieve what has been decided. Sustainable urban management should be based on the above process.

2.3.2. Variation of tools working towards integration

The process of sustainable urban management requires a range of tools addressing environmental, social and economic concerns in order to provide the necessary basis for integration. There are various tools, some addressing environmental, social, or economic concerns of urban management separately, others attempting to combine these concerns. The Sustainable Cities Project focuses on the environmental tools available to urban management processes.

2.3.3. Five main tools

Five main groups of environmental tools are advocated. These are:

1. collaboration and partnership;
2. policy integration;
3. market mechanisms;
4. information management;
5. measuring and monitoring.

Each tool is considered as an element within an integrated system of sustainable urban management. There can be no prescriptions for how to use or combine these tools; there are many ways of moving towards sustainability. Institutional and environmental contexts are different in different Member States and in different cities, and each therefore requires a novel approach. The fundamental goal is to achieve an integrated urban management process, but the elements in that process will evolve through the interplay of different interests.

2.3.4. Active role of the government and the "super government"- question of subsidiarity

The approach to these tools implies a need for a broader and more active view of the role of government, especially municipal government, than has become current in parts

of Europe. Management for sustainability is essentially a political process which has an impact on urban governance. The tools advocated this report are all means of modifying or constraining the operation of professions, performance monitoring, and markets within sustainability objectives set from outside. By applying these tools, urban policy making for sustainability can become much broader, more powerful and more ambitious than has hitherto been generally recognized.

2.3.5. Acceptance by the public: legitimation

The political process of democratic choice can legitimate both sustainability objectives and the means to achieve them - provided people are educated and accurately informed about the consequences of their choices. Many of the problems related to unsustainability are only soluble if the people accept limits on their freedoms. These limitations can only be acceptable if the people affected choose or at least consent to them. The 'social contract' model of politics, in which civil society is created through individuals voluntarily agreeing to collective limitations on their own actions in order to make them all better off, holds the solution to sustainable urban management.

2.4. Integration

2.4.1. 5th Action Program

The necessity for coordination and integration is emphasized in Chapter 8 of the Fifth Action Program on the Environment. This is to be achieved through the combination of the subsidiarity principle with the wider concept of shared responsibility. In setting out the recommendations which emerge from the Sustainable Cities Project the Experts Group is seeking to achieve both horizontal and vertical integration.

Horizontal integration is necessary so that further integration of social, environmental, and economic dimensions of sustainability will have synergetic effects and therefore strongly stimulates the process towards sustainability. Horizontal integration requires integration between the policy fields within municipalities, within regional and national authorities and within the European Union. This latter is required across the European Commission's activities as well as within each Directorate General.

2.4.2. Coordination of sectors

At local, regional and national level a movement towards integration between policy field or sectors has started. Projects, research programs etc. are, at least in some Member States, developed, stimulated and disseminated through horizontal structures in organizations.

Vertical integration across all levels at European Union, Member States and regional and local governments is equally important. Vertical integration might result in greater coherence of policy and action, so that the development of sustainability at local level is not undermined by decisions and actions by Member States governments and the EU.

2.5. Ecosystems thinking

2.5.1. Starting with hydrological systems/networks and infrastructure

The ecosystems approach regards energy, natural resources and waste production as flows or chains. Maintaining, restoring, stimulating and closing the flows or chains contribute to sustainable development. The regulation of traffic and transport is another element of the ecosystems strategy.

The dual network approach is based on these principles. This dual network approach provides a framework for urban development at a regional or local level. This framework consists of two networks: the hydrological network and the infrastructure network. This hydrological network structures the urban planning in order to improve the water quality and avoid fast run-off. The infrastructure network provides opportunities to minimize car mobility and to stimulate the use of public transport systems and walking or cycling. In the plan design process attention should be paid to:

- water quality and water quantity, main structures, ecological values etc.
- existing or new public transport, employment and amenities in relation to residential areas, integration of walk and cycle routes in residential areas etc.

The Report does not take in account the ecosystems thinking in the "air domain". This is an aspect yet to be elaborated.

Analyzing these aspects will result in basic principles for urban sustainability from a

physical ecosystems point of view. However, the ecosystems approach contains a social dimension as well, which considers each city as a social ecosystem. Niches and diversity form the elements of this social ecosystem.

Finally, the ecosystems approach emphasizes the city, as a complex system which is characterized by continuous processes of change and development.

2.6. Cooperation

2.6.1. Learning and doing and exchange

Cooperation is an essential part of moving towards sustainability. Collaboration and partnerships between different levels, organizations, and interests is essential for two reasons. First, it reduces the tendency of individual organizations and agencies to pursue their own agendas in isolation from the broader public interest. Second, most problems can only be solved through coordinated action by a range of actors and agencies, in line with the principle of shared responsibility as advocated by the Fifth Action Program on the Environment.

The Sustainable Cities Project emphasizes the importance of 'learning by doing'. Involvement in decision making and management means that organizations and individuals engage in a process of mutual betterment. Viewing sustainable urban management as a learning process both reinforces the point made earlier about taking the first step towards sustainability and highlights the importance of experimentation.

Much can be learned from sharing experiences between cities. However, it must be acknowledged that transferring lessons on physical matters, such as river basin management and recycling initiatives, is currently easier than with spatial planning initiatives because of the extra complication imposed by the variety of legal and cultural issues on which planning systems are based. The possible emergence of a spatial development perspective for Europe over the coming years offers considerable potential for the application of sustainability approaches to spatial planning.

Two categories of collaboration are specifically promoted in the report. The first category is focused on the operations of local authorities and include professional education and training; cross-disciplinary working; and partnerships and networks. The

second category is focused on the relationship between a local authority and its community and include community consultation and participation; and innovative educational mechanisms and awareness raising.

2.6.2. Cooperation and partnership

A key goal is to create the conditions that enable collaboration and partnership to take place. This is important for the above mentioned reasons, as well as because cooperation promotes equivalence between actors, rather than hierarchy, thus facilitating increased understanding and sense of responsibility among different actors.

2.7. Sustainable management of natural resources - Conclusions:

Chapter 4 in the Sustainable Cities Report identifies the problems of consumption of non-renewable or slowly renewable natural resources that exceeds the capacity of the natural system. It links this problem to the related waste accumulation that is characteristic of today's lifestyles in European cities.

The functioning of urban systems is compared to natural systems, where equilibrium is maintained by circulating resources and wastes internally. The difference between the functioning of the natural and the urban system lies in the way the latter is dependent on importing natural resources and energy into the city and exporting waste and pollution out to the surrounding areas. Instead of being closed systems, where natural resources are used in an economical way to provide energy, and any unused material is reused, recycled or processed for re-entering the circulation process, cities are highly dependent open systems. By depending on surrounding areas for the provision of natural resources and energy, and for the disposal of waste, cities impose their problems on these areas. Depletion of natural resources, pollution and environmental degradation with their resulting social, economic and environmental consequences affects the rural population as well as urban systems themselves.

The chapter emphasizes that a more sustainable functioning of urban systems requires a move towards management of cities that makes use of the lessons that nature can teach us about ecological and economical flow management.

An integrated approach to closing the cycles of natural resources, energy and waste

should be adopted within cities. The objectives of such an approach should include minimizing consumption of natural resources, especially non-renewable and slowly renewable ones; minimizing production of waste by reusing and recycling wherever possible; minimizing pollution of air, soil and waters; and increasing the proportion of natural areas and biodiversity in cities. These objectives will be easier to work towards on a small scale, which is why local ecological cycles are the ideal basis for introducing more sustainable policies for urban systems.

2.8. Sustainable management of natural resources - Recommendations:

The issues of natural resources, energy and waste are closely interconnected. Cities are places of high energy intensity, and energy plays an increasingly important role in the operation of the urban systems. The more energy that is consumed, the higher the need for natural resources to support the energy production. Similarly, the higher the consumption of natural resources and energy, the more waste is accumulated.

Due to this inter-relationship it is logical that several of the relevant policy options have multiplier effects. So by addressing one particular problem, the policy options may simultaneously solve one or more other problems.

The key goal of sustainable management in relation to air is to ensure quality and supply. This can be achieved by reducing pollution sources and quantities, and by promoting air generation and filtering. Several technical measures and regulatory instruments can contribute to reducing pollution. The provision of more green elements in cities can increase the capacity for air generation and filtering. Green elements also serve to reduce noise pollution, assist the formation of suitable micro-climatic conditions, manage storm water, and provide recreational and aesthetic values. It is recommended that the measures designed to improve air quality and supply are developed within an overall framework of an action plan for air quality. This will be a requirement once the EU's 'Framework Directive on ambient air quality assessment and management' becomes operational.

The general aim in relation to soil, flora and fauna is to increase the proportion of natural and human made eco-systems within cities. Developing green corridors linking country-side to the various green elements within cities provides the best ecological

frameworks for habitats, thus combining an increase in biodiversity with recreational value. A move away from mono-culture towards increased biodiversity is another important aspect in the sustainable management of cities. It is also recommended that green elements are used to provide a ground for education and awareness raising in relation to the way ecosystems function and how urban functions can be integrated into the natural system.

The principles of sustainable water management are related to water conservation and minimizing the impact of all water related functions on the natural system. Measures to green cities are also beneficial for the water system. Maximizing the use of penneable surfaces facilitates the infiltration and cleansing of storm water, while creating ponds, ditches and wetlands facilitates the retention of storm water, purifies the water and enriches the flora and fauna. The issue of water use efficiency is also crucial in sustainable water management. Taking into account the end use of the water in determining the required quality is a means that aids water conservation. Collecting storm water for secondary uses and recycling grey water are important measures.

Significant advances have been made in developing more environmentally friendly sewerage solutions. Biological treatment plants and passive water treatment methods based on ecological functions should be more widely utilized. These have clear environmental benefits, and some provide recreational and educational values too. The basic aim of sustainable energy management is concerned with energy conservation. The key to energy conservation lies in behavior of individuals and organizations, but also in energy production and distribution. Non-renewable energy sources should be replaced by renewable ones wherever possible. Both energy management and production should be decentralized. Developing local energy management systems and local energy production facilities increases the possibility for coordinating actors, for working actively towards reducing energy demand and increasing efficiency of production and distribution. The application of sustainable design principles play an important role in energy conservation. Densities, siting, layout, bio-climatic architectural design, materials, insulation, orientation of buildings, micro-climate, green elements etc. can make significant contributions to minimizing energy consumption.

The role that cities can play directly is also significant. Through an energy audit of both

internal and external activities, and of the city's own building stock, cities can move towards adopting suitable energy efficiency measures, thus contributing to energy conservation while reducing running costs. Greening the city's activities in such a way, also provides a valuable example for other organizations and individuals to follow. It adds credibility to any awareness raising initiatives undertaken by cities.

Various solutions that utilize waste for energy production serve the dual purpose of conserving natural resources and making efficient use of waste products.

The ultimate aim of sustainable waste management is, however, to minimize production of waste. The reduction of packaging, and the increased use of reusable and recyclable packaging contribute towards this aim. Maximum separation at source and composting minimizes waste production, reduces the level of contamination of waste, and turns some of the waste into useful forms, such as topsoil or biogas. Other policy options for waste management coincide with those for water management, especially those for liquid waste management.

Finally, influencing behavior through education, information and practical evidence is a key factor in achieving more sustainable urban systems. The relationship between influencing behavior and sustainable management of natural resources is particularly evident. It is an area where people's behavior affects the level of sustainability very directly. Often it is also an area where people can see the results of changed behavior in a very transparent way.

3. PAY-OFF

The work of the EU Expert Group on the Urban Environment shows clearly its commitment to tackle problem in the environment in a comprehensive way. So the solving of the air pollution problem has to be looked upon.