THE PRESERVATION OF HISTORIC BUILDINGS AND

MONUMENTS IN THE MAZE OF COMPLEX URBAN DEVELOPMENT POLICY

by

Uwe Schubert

Interdisziplinäres Institut für Umwelt und Wirtschaft
der Wirtschaftsuniversität Wien
Althanstrasse 51, A-1090 Wien
Austria

1. INTRODUCTION

1.1 Positive and negative influences on historical monuments in cities

Historical monuments (HM's) in general and ensembles thereof, represent a valuable asset to human settlements. Their existence links past and future generations and gives places their specific identity and image. This identity is an essential ingredient in a set of conditions providing continuity.

Attractive cities with an image and endowment culture and art have also become foci of new developments in tourism, providing significant revenues for private and public sector, thus becoming the indispensable contributors to local and regional economies. At the same time the sentiment of belonging to a place is an important feature preventing the emigration of population even in difficult times. This sentiment also is an important factor in enhancing the attractivity of a place for potential immigration of human resources, constituting the most important longrun development potential of regions and cities. This phenomenon has been particularly well observed in postindustrial societies, where a "reurbanization" movement to attractive urban places (particularly their centers) trend for the best educated and young segments of population can be identified in the past two decades (v.d. Berg et al 1979, Schubert 1982) .

It is for this reason that the present contribution is focused on urban regions, where the highest density of HM's are located on the one hand, but where particularly man-made pressures on them tend to warrant social action. As a result the preservation of these monuments has become a rather powerful political motive

making new allies out of social groups which often lack experience and tradition in the local political arena. HM´s, however, are in principle an endangered species and the advocates favoring their preservation face some formidable opponents:

- The natural process of ageing and physical decay needs to be kept at bay at considerable cost to the private as well as public owners.
- Natural disasters take a heavy toll, particularly in some regions of the world.
- Man-made disasters in several guises, from war and vandalism to unqualified repair work, are a continuous threat.
- Air-pollution and acid rain lead to accelerated decay and progressive destruction.
- Land-use conversions can deprive cities of their cultural patrimony.

Policies to protect the cultural heritage in an urban place in general and with respect to HM's in particular are necessarily, it seems, by the very nature of the various threats, complex and difficult to organize, monitor and control.

In most countries a standard procedure has evolved over recent decades to address problems of protecting nature as well as monuments. Most of these procedures rely heavily on "command control" and types of administrative approaches. Environmental policy mostly characterized by approaches which set emissions or residuals' concentration standards (defining "goals" of policy) and direct control measures executed by public authorities. Similarly in the field of preservation of monuments in general (and HM's particular) "goals" are expressed in the form of "listed buildings" (or monuments) and related urban

planning relies on zoning ordinances and building codes. Special public authorities make sure that these ordinances and codes are being obeyed. Undeniably many success-stories can be told but, as is to be expected, the contrary holds in some cases.

This form of policy regime has experienced some heavy seas recently, mainly due to the budgetary problems many governments are facing and the related strategy of privatizing public activities to get rid of deficit prone endeavors. Additionally the economics profession, seeing itself as the keeper of the holy grail of efficiency to ensure the optimal use of scarce resources, has not tired in advocating the adaptation of market or at least quasi - market like solutions. argued, would it is increase long efficiency, enhance entrepreneurship and ingenuity for social purposes, and potentially reduce budget deficits feasible. fact when Despite the that there disagreement among the professionals which approaches are reasonable, there is a consensus that such systems should be introduced. As is to be expected, there are numerous alternatives to the command and approach warranting discussion and scrutiny before they can be safely let loose on society.

The present contribution constitutes an attempt to explore some ideas developed in environmental economics (where the preservation of natural resources is the primary goal) dealing with externalities threatening resources, and to apply these ideas to HMs. More specifically the problem of maintenance investment and land use conversions is exploratively considered (in a previous paper and deposits due to some emissions typically found in urban regions were discussed in this framework as well and a short review of the relevant literature was added; see Schubert 1997).

1.2 Historical monuments and externalities

HM's are owned by both private or public entities ownership shares differ widely although countries worldwide. In the case of ensembles the elements frequently belong to several owners. This fact by itself often presents a considerable problem when questions of maintenance are concerned. In the view of economists, however, the problem is particularly aggravated by the fact that monuments, independently of their ownership, possess public good characteristics. They have positive, aesthetic or negative (in the case of decay) social value for everybody having the option to see them. The visual "consumption" by one person does not diminish the option for consumption by others (except in cases of heavy congestion, a condition observed in some tourist centers). Additionally the situation is complicated by the fact that generally difficult and costly to charge for their consumption to make sure that no free-riders get away without making a contribution. The owners of HM's, the absence of any policy provisions, cannot generally make the revenues correspond to the social value of their property, thereby making it possible for them to create an investment fund for maintenance.

If HM's cannot be fully "privatized" and hence can be considered a "public good" in the sense described, in some cases, this situation can lead to socially undesirable consequences: (2)

• The value of the location of the HM (expressed in the market price of the site) exceeds the net revenue obtainable by the owner (who is not able to turn the aesthetic value fully into revenue). This makes it profitable to change the land use at the site, often

by destruction of the monuments and construction of new buildings appropriate for the most profitable new land-use.

- Necessary maintenance investment is not made, since the revenues are not signaling the value of the monument properly and costs incurred cannot be recovered.
- Policies obliging the owner to maintain his property and making it practically impossible to change its use, sometimes lead to the result that decay is "assisted" in order to reach a state where the building constitutes a public hazard. The demolition of the building allows the allocation of the land to more profitable private use, despite the fact that the social value of the HM might be higher than the private one.

The consequences reflect the market framework of our economies. The absence of markets and the public good properties of many cultural resources can be blamed for their calamity. The sheer scale of activities in a modern economy and the recent history of more or less uninterrupted economic and urban growth, many authors would claim! The most important features of this argument are:

The city centers, where most of the urban HM's tend to be located, have come under constant pressure in urban history (see e.g. v.d. Berg et al. 1979 and Klaassen et al.1987). In times of rapid increases of population in urban areas ("Urbanization phase") without significant increases in personal income, the transportation costs between the place of work and residence are high relative to income. The demand for centrally located land in urban areas for residential as well as commercial purposes rises dramatically,

increasing the pressure for land-use conversions and thus the destruction of HM's. In a subsequent phase of urban development ("Suburbanization") higher per capita income raises the demand for suburban housing, becoming a threat for natural habitats in the former hinterland. This process, particularly in the later part of the phase leads frequently to cumulative processes of decay in the old city centers ("flight from plight"), higher pollution and criminality in some areas. The cumulative downward spiral not only keeps private (and very often public) owners of HM's from necessary investments, as expectations for obtaining appropriate revenues from these objects are lower than ever, but, as mentioned above, commercial development ("CBD formation") demands central locations, although at lower intensity than in the previous phase of urban development as suburban locations increasingly become the prime target of commercial real estate development. In some industrialized countries this trend even went to the point where entire urban agglomerations became part of the gloomy picture, losing population businesses to less densely populated ("Desurbanization"). In the last decade a reversal of the decentralization process has been observed in some post-industrial countries ("Reurbanization"). locations for residential purposes and demand central land by high level tertiary activities have led to urban renewal activities and the gentrification of centrally located but run-down areas in large cities. HM's have become an important ingredient in the urban fabric constituting a primary element of urban identity and attractivity. Frequently, however, they are seen as obstacles to commercially profitable land-use changes.

Having pointed out some of the causes for the decline of HM's and some new hopes in the form of a new social demand for their preservation in the course of a

new phase in urban development, the question arises as to how a policy framework can be found to produce socially more desirable results. Obviously this endeavor has been with us for some time and alternative approaches can be observed. The following section reviews some of the ideas proposed in the environmental economics literature and sketch the essential ingredients of a consistent policy framework.

2.INTERNALIZING EXTERNALITIES AND URBAN DEVELOPMENT POLICY

2.1 Designing policy, elements and tasks

Planning theory in its simplest form postulates the following elements to be an essential part of any consistent plan:

- An analysis of the present state of the system is undertaken, particularly an identification of the most important problems
- The goals to be achieved need to be spelled out
- The constraints for action have to be assessed
- The technological strategies and options for action must be considered
- The instruments available to achieve behavioral changes have to be specified
- The implementation warrants monitoring and control.

2.1.1 Identification of problems

The two essential elements of this analyis stage applied to a plan for the preservation of HM's are:

- Which HM's exist in the city (inventory)?
- In what condition are they (damage inventory)?

These questions involve the design of a system of indicators characterizing the present stateof the HM's. It is particularly the urban renewal pressure on the sites of HM's which are difficult to assess. This is because no single variable reflects this pressure. The relative evolution of land prices between core and ring agglomeration has been used as of an а signal, relatively higher prices in the core indicating a higher pressure for redevelopment in that urban zone where many HM's tend to be located. As many high level services generally bid for central locations, it can be argued that increasing shares of the most advanced service functions are a good indicator of increasing pressure on centrally located sites, but this indicator is very indirect.

Additionally the institutional framework in which policy can be implemented must be assessed and evaluated (this is particularly necessary with respect to the present allocation of property rights).

2.1.2 Setting goals

How can policy goals be formulated? In principle two options exist, i.e. the use of fixed targets such as lists of HM's to be protected, or the use of flexible goal definitions such as "optimizing", "improving", "reducing", etc. Goals can be defined in terms of stocks (listed monuments....) or flows (rates of demolition, additions to the list, etc.....).

The setting of goals in the complex situation dealt with here, which normally involves multiple goal systems in particular, is a conflict prone process. Three types of conflicts can be identified:

• The problem of trade-offs between different goals, where one can only be achieved at the cost of another

- as in the conflict between technology and limited resources (budgets).
- Different priorities by the relevant actor groups, resulting from differences in education, income, burden of cost sharing, etc., need to be accommodated, as only one level of the public good in question can be achieved and individual demands cannot be met by relevant markets.

A technique sometimes applied to define "socially desirable" goals and to resolve the various conflicts cost-benefit analysis or some variant thereof. Sometimes these decisions are made by voting, on the basis of a referendum at the appropriate local level (e.g. in Switzerland) or some other political decision process. In general, however, it is very difficult to achieve a solution with which people are relatively satisfied. This is due to the fact that public goods are at issue, as mentioned above, of which only one level can be achieved. A majority based decision rule obviously leaves the losers in an unhappy state of mind. The same holds true for those whose preferences in their opinion were not properly weighed in the costbenefit analysis. This problem is aggravated by the fact that there is very little incentive for citizens to answer honestly to a question as to how much of the public good they would like to see in their city. If they are not told how much cost to them personally would be involved, they tend to overstate their demand. If they should guess that their shares will be defined the basis of the intensity of their revealed preference, there is an incentive to understate the real demand. This problem is usually referred to as the "free-rider" phenomenon. It indicates a tendency to rely on others to pay, to remain undetected and to

benefit from the others who are expected to state their true preferences and pay accordingly. As this strategy, it must be suspected, will be followed by many, the "real" demand tends to be understated. This problem arises not only in the case of any plebiscitary approaches to policy goals' formulation, but also in the framework of a "readiness to pay approach" often advocated in cost-benefit analysis.

Neglecting this conundrum for a moment, it can be shown that only under extreme discretionary power of a "government", which is able to manipulate distribution of income and which happens to set the sharing arrangements at proper rate, a satisfactory solution can be found (named Lindahl solution, honoring the Swedish economist who first worked out the problem). The upshot is, that long lasting plans and arrangements are very unlikely to be a feature of any political system dealing with the subject.

2.1.3 Assessment of constraints

Usually 3 types of constraints are to be considered in this framework, i.e.

- budgetary
- technological
- legal

They will not be dealt with in this contribution in any detail.

2.1.4 Strategies

Strategies are defined in this context as technological options making use of priciples suggested by physical planning alternatives. The following options are presented as pure strategies for purposes of clearer exposition, in practice mixed strategies are

common. Furthermore the "ceteris paribus" assumption holds, postulating that only a single variable is changed to delineate an alternative.

What are the options available to prevent the destruction of HM's in the course of land-use conversions? Among these possibilities are:

- Leave HM's unchanged but change their use (applicable mostly in the case of buildings), making only marginal adaptations
- Leave only the facades and build a modern structure behind it
- Move the object to another location (infrequently even considered in the case of buildings)
- Leave part of an ensemble and demolish or adapt (or relocate) the other.

Which of these options are chosen depends again on the policy framework operative in a specific city. It important to remember that the entire urban development strategy and not only the narrower protection policy has a major bearing on the long-run fate of the objects to be protected. Master plans intended to steer the development of a city over a longer period of time (and the resulting zoning plans as well as building codes and particularly the planning of transportation infra-structure in an urban region) determine the pressure on land-use conversion often as emphatically as direct market pressures influence landmarkets. With respect to maintenance several options exist in principle (for technical state of the art discussion see Baer and Snethlage 1997). Which options are chosen by land-owners and the people demanding land, depends crucially on the policy instruments chosen.

2.1.5 Policy instruments

If HM's are exclusively owned by the public and the goals of preservation policy are established, direct action can be taken by the authority responsible, having decided upon the optimal mix of technological strategies. In general, however, property rights are not concentrated in one hand. The problem arises therefore as how to influence the decisions made by a multitude of owners in the socially desired direction as laid down in the "goals" of policy.

How can people be motivated to change their behavior, to adopt strategies which are likely to preserve HM's and avoid building up pressure leading to land-use conversions?

whole principle there is а spectrum pössibilities, the distinguishing criterion often used by economists is the degree of voluntary action taken by an individual. So obviously the extreme points on an "voluntary action" imaginary scale are full "coercion". Somewhere in the middle are those methods depend on social and economic which pressures (incentives and disincentives) which stimulate socially desired actions. In the sequel some prominent examples (i to iii below) of such schemes are briefly sketched, the list is open by necessity, there are no limits yet discernible to such ideas of "social engineering". Another word of warning is in order at this point. Typically in economic analysis (hence often referred to as the dismal science) there is no single a-priori "best" solution to any of these problems-which means in the vernacular that there is no rose without thorns. Each instrument carries with it a whole scenario of pros and cons, making trade-offs necessary. It should also be noted that some of the suggestions touched upon below, have yet to wait for their debut in real life, making evaluations and even assessments of the tradeoff relations difficult. Often one has to rely on

speculation or purely theoretical arguments. Whereever possible, at least some of the problems connected with these approaches to policy will be highlighted.

(i) Voluntary action

Starting from the assumption that citizens are fully informed about the problems and options available in connection with the provision of a public good (as in the case of the aestethic benefits provided by HM's), there is an incentive for concerned people to act to improve the situation.

How can this be done in principle? (see e.g. Tietenberg 1992, Pearce & Turner 1990)

- Individual actions without any explicit public policy Individuals choose strategies available in the direction of the achievement of the social goal (i.e. repair work on the HM's without subsidy by owners or citizen groups, or direct expectation of a return on the investment).
- Information and education

 Collective action is required in the form of education to make people understand the value of HM's, leading to individual actions in the socially desired direction.
- Moral suasion
 - Individuals attempt to persuade other citizens to follow their example of altruistic behavior or to adopt novel ways of achieving social goals (some strategies hitherto unknown may actually save money and reduce costs of production and consumption)
- Social contracts among concerned citizens specifying the strategies to be adopted by all contractors and the consequences of non-compliance (3). Example of such "contracts" are voluntary associations of citizens or companies sharing the goal to protect HM's or the

natural environment.

Some economists argue, however, that it is very unlikely that individual voluntary actions will be taken over a long period of time. The theory behind this argument comes from the "Theory of Games Conflicts", and is usually referred to as the "Prisoners' Dilemma". The simple logic is that individuals tend to act in a socially desireable way only, if they can be sure that all others (or at least a decisive majority) will do the same.

In a situation of decay of HM's, in which all owners of elements of an ensemble for example, could benefit by repairing and renovating their property more or less simultaneously, making the quarter of the city the ensemble is located in more attractive and hence higher revenue-prone. If, however, one owner does not join, he can "free ride" from the investment by the others, owning property in a more attractive part of the city. Evidently, it is likely that the others will think the same way and decay continues in a downward spiral.

dilemma needs to be broken. One mentioned above is to make project-related voluntary "social contracts", to try to ensure that agreements will be adhered to. How likely is it that contracts will be made without any intervention by some public "institutions" (such as city hall, etc.)? In a famous paper Coase (1960) argued that, if there is a demand for the public good and it is not provided by markets (by the very nature of the good) then there is a very strong incentive for people to start negotiating and to reach an agreement (an action plan), including cost shares, etc. The advocates of this proposition see no need for any action by the state (of whatever kind or tier). The law only has to clarify the property rights and the penalties if the contract is broken. The

allocation solution in terms of the actions (such as agreed upon cuts in emissions) taken will be indifferent to the decision on property rights, only the income of the concerned will suffer differentially

There are many counter-arguments, however, as to the likelihood of such "social contracts". If the number of parties concerned is considerable, the transaction costs of negotiating very quickly become prohibitive ("time is money", etc.) and agreement is unlikely to be reached. The bargaining positions of the negotiators can be very unequal and such inequality should not be accepted, is an other argument often encountered against a "laissez-faire" (or rather negotiatiation) solution.

Summarizing it can be stated that the economics ? profession tends to be generally rather skeptical visa-vis voluntary actions and instruments relying "moral suasion", although it is generally agreed that information and education about these matters necessary elements in designing policies, as it can be expected that policies will be discussed only in the long-run, if aesthetic urban settings are high on the priority list of citizens. To make these become a reality, other instruments to assure avoidance of the dilemmata discussed above will be necessary. It is the profession's belief that incentives and some kind of social and economic pressure are necessary to assure success. A similar idea could be worked out in connection with the preservation of HM's.

The choice of strategies outlined above is entirely up to the actors, either as individuals or acting as a group under a "social contract", in which these options should be specified just as the goals of the planned actions (e.g. in terms of certain reductions in emissions or maintenance strategies, etc.). Note also that in the case of individual actions without

"contract" the goal to be achieved for the society cannot be easily identified and monitored.

(ii) Directly price related incentive policies

The principal idea is to charge the producers of negative externalities a price for their activities, or to make the land where HM's are located more expensive for other land-uses incompatible with their existence at that location.

For the protection of HM's some options are:

- Based on an inventory of HM's to be protected, a "standard" is set, specifying which part of the existing stock should be preserved, taxes are charged for potential changes in land-use high enough to compensate all citizens monetary and incurring psychic costs as a consequence of the destruction of the monuments (Pigou-principle) and to prevent such actions. Note, however, that actors have freedom of choice of strategies as sketched above, e.g. gutting and keeping the facade, moving the monument, etc. The system in its pure form does not provide safeguards against undesirable strategies such as be demolution, they would have to excluded explicitly, making administrative interventions necessary, which runs contrary to the very spirit of the proposal.
- Analogously a minimum maintenance standard for all listed HM's could be defined and determined by society (by referendum, voting procedures, experts' committees, etc.). Falling below this standard would imply paying a tax high enough to ensure appropriate actions by the owners of the HM's. The tax money could be paid into a "Monument Preservation Fund", which could be used to further the cause (by funding e.g. R&D on maintenance techniques, buying endangered

monuments to be added to the list possibly transferring ownership later to "concerned citizens", etc.)

- A maximum number of land-use conversions in the relevant zones of a city or region could be fixed and the rights for such conversions be auctioned off. A spectrum of the conversions needs to be specified, from complete demolition to only minor adaptations. These titles could then be traded between interested parties and market prices signaling the need for such conversions would be formed and dynamically adjusted. A modification of the standards can be achieved by licenses and withdrawing them buying (selling) for) from further These (adding them use. transactions can be made by public authorities or by groups of interested citizens.
- The same principle could be applied to maintenance management. A standard of maintenance needs to be defined as well as a total volume of licenses per time interval (one year or 5 years, e.g.) granting the right for the time interval specified not to invest in maintenance. These licenses are distributed to the owners of HM's in an auction, consecutively they can be sold and bought in a "stock market". As these licenses are costly, the alternative to invest in the monument will be carefully considered by the holders, as they can then sell their licenses. In this system the "public" owns the implicit right to enjoy the beauty of the monuments, violators must pay for not maintaining the estethic value of the SM.

Despite these (and other) drawbacks economists favor these price-related schemes as they guarantee long run efficiency in the system, claiming that a standard is achieved and maintained at minimum economic sacrifices

(in the form of foregone consumption in an economy). Additionally it is important to note, that most of these suggestions have not been applied in practice and most of the scarce examples stem from very recent times, pertaining to pollution abatement policies exclusively (at least to the author's knowledge).

The more traditional approach is to subsidize the In this case this positive externalities. implies financial aid to promote repair and maintenance activiand to prevent land use conversions. subsidies should be hich enough to allow the socially desirable and predetermined standard to be achieved and mainained. This variant, often applied and usually not by a great deal of political resistance, however suffering from the fact that tax money necessary to support such a policy. As it is one of the aims of this contribution to explore possible alternatives to public budget bound management systems, this theme is not persuade further.

Administrative measures

This is the everyday life of environmental policy and efforts to protect HM's, it is thus assumed that the reader is familiar with the various options in this field, so they will not be discussed further here. As to the efficiency and cost-effectiveness, differ widely. Economists generally claim that with all red tape and bureaucracy involved with procedures in general, they tend to be inefficient and rigid. As awareness of environmental and urban quality of life is increasing so is the flood of regulations concomitant the cost of administration monitoring. These exponentially rising costs could cause serious budget problems and could potentially lead to the demise of the whole policy area. On the other hand, as already mentioned above, in cases where

stringent standards (complete preservation, exclusion of certain residuals, very fast and drastic actions necessary) other policy instruments will usually not do. Strict, direct regulation should be applied, hence, only in the absolutely necessary cases just mentioned, otherwise various incentive schemes as sketched above, could conceptually lead to much better results. In these cases it is in the self-interest of people to act in the socially desired direction, thus providing, at least partially, self-policing, decentralized and mostly unbureaucratic policy systems. As only very scant empirical evidence is available as to the real-life functionality of these proposals, an evaluation is practically impossible at this point and research is badly needed.

3. Outlook

It seems much more difficult to envisage some price (tax) related policy system to be implemented for the protection of HM's. It may be worth while, however, to start thinking about such approaches in а less speculative and superficial way than the ideas sketched in this contribution represent. It may well be possible workable system depending design а bureaucratic procedures than is mostly the case today. between different The problem of consistency "standards" would, however, remain even implementation side were shifted to special markets or quasi-markets. Needless to say that a lot of research able still needed to be to make reasonable suggestions for a new system of policy. This research will have to pay particular attention to consistency, hence having to adopt some "system-theoretic" approach.

Footnotes:

- 1• "privatized" in this case implies that all "consumers" of its
 beauty must pay for the consumption and no free-riders exist.
 This property of the monument is independent of its legal
 status.
- 2. "consequences" The discussion on public goods and the consequences of this condition can be found in any textbook of environmental economics, see e.g. Pearce & Turner 1990, Tietenberg 1992, Wicke 1991, Baumol & Oates 1988.
- 3 "...consequence of non-compliance" In some cases consequences are formulated positively in the case compliance and additional effects to reduce emissions, as is case in the E.M.A.S. (Environmental Management Assessment System) of the E.U. Companies go through an environmental audit voluntarily, if the criteria of excellence are met, the firm joins a club of "green summa cum laude enterprises".
- 4. "...forced to do so" An example is the producers association B.A.U.M. (Bundesweiter Arbeitskreis für umweltbewußtes Management) in Germany and Austria, the "Responsible Care" program in Canada, etc.
- 5. "RECLAIM" An overview of various tax and fee related reforms to reduce pollution loads is presented in Gale, Barg and Gillies (1995). The Scandinavian countries have introduced a CO2 tax recently, in the U.S. an ozone-depleting chemicals tax is now in effect, etc. For a first evaluation of the RECLAIM-program in California see Burtraw 1996.
- 6. "...suffer differentially" For HM's such direct negotiations between the owners and concerned citizens are a rather widespread approach(see Snickars, in Baer and Snethlage,1997). Property rights of the aestethics are usually seen as being allocated to the owner of the monument, hence payments for maintenance investments have to be made by these citizens's groups (or some public office). If, however, the aestethics belong to the public, the owner of the SM has to pay a tax (fine) for not maintaining his monument properly.
- 7•"...preservation of HM's".Owners could be motivated to have their HM's "audited" (assessment of the state of the monument, management system to ensure monitoring and maintenance, etc.)in various ways.Cosequences could range somewhere from prizes to tax rebates, etc.

References

- Arthur Pigou (1920) The Economics of Welfare; Macmillan, London.
- Ronald Coase (1960) The problem of social cost; J. of Law and Economics
- James Buchanan (1969) External diseconomies, corrective taxes and market structure; American Economic Review
- William Baumol and Wallace Oates (1988) The Theory of
 Environmental Policy; Cambridge Univ. Press,
 Cambridge
- William Baumol and Wallace Oates (1971) The use of standards and prices for the protection of the environment; Swedish Journal of Economics, 73.
- J.H. Dales (1968) Pollution, Property and Prices; Univ. of Toronto Press, Toronto.
- Thomas Tietenberg (1985) Emissions Trading, Resources for the Future; Washington D.C.
- A. Zerlauth and U. Schubert (1996) The coordination of environmental policy and urban planning-First results of some case studies. In: Proceedings of the European Regional Science Conference, A. Rossi (ed.)
- B. Gale, S. Barg and A. Gillies (1995) Green Budget Reform An international casebook of leading practices;
 Earthscan Publ., London.
- Garrett Hardin (1968) The Tragedy of the Commons, Science 162:1243-1248
- Richard A. Livingston (1990) "Service Life Prediction and Life-Cycle Costing for Materials Damage as a Result of Acid Deposition"; Service Life of

- Rehabilitated Buildings and Other Structures, ASTM STP 1098, Stephen J. Kelley and Philip C. Marshall, Eds., American Society for Testing and Materials, Philadelphia, 1990, pp.40-56.
- David W. Pearce and R. Kerry Turner (1990) Economics of

 Natural Resources and the Environment, Simon &

 Schuster, Herfordshire, U.K.
- Thomas Tietenberg (1992) Environmental and Natural Resource Economics, Harper Collins, N.Y.
- Dallas Burtraw (1996) Trading Emissions to Clean the Air:

 Exchanges Few but Savings Many, Resources 122,

 Resources for the future, Washington D.C.:3-6
- Uwe Schubert (1982) Suburbanisierung oder Re-urbanisierung, welche Alternative? J.Csillaghy & M. Bassand (eds,). Die Stadt als Ausdrucksform von Dialog und Konflikt:107-113, IREC, Lausanne
- Lutz Wicke (1991), Umweltökonomie und Umweltpolitik, C.H.

 Beck Verlag, dtv, München, II.C
- Leo H. Klaassen, Leo Van den Berg and Leland S. Burns,
 Spatial Cycles; Gower Publishing Company, 1987,
 Aldershot, UK