

LAND USE AND ENVIRONMENT IN TRANSPORTATION PLANNING
As an option among others in rapidly growing and motorizing cities

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The Argument

We have long been aware that the pattern of land use defines the demand for transport and constrains the modes of transport in use. And we know that the modes of transport in use and infrastructure partly determine the future of land use. During current concerns for local pollution, congestion and global warming strong efforts are made to plan land use in such a manner as to reduce kilometers traveled. There is effort in cities everywhere to plan land use cluster trip origins and destinations, to densify urban development, to invoke transit orientated development, smart growth, neo-traditional planning. This has been going on now for a number of years. In most countries it has been only very modestly effective. The exceptions are a very few countries with remarkably strong land use controls or which have significant possibilities for government entry into the land development process. Yet we continue to bear the banner of land use planning as a potentially strong form of improvement of transportation caused problems.

The basic argument is:

- A. Thoughtful land use planning has many virtues to improve urban life, but one of them is not congestion mitigation and air quality improvement, at least in developed cities.
- B. The more forceful pursuit of these objectives requires firm attention to traffic management, including such actions as vehicle use restraints, congestion pricing,

and parking pricing—which in turn will have positive effects on land development.

- C. Direct land development initiatives, particularly where government has some sort of possibilities for significant intervention, may be more feasible in the global south than in the global north.

The Settings

Research in the US by Pickrell and Schimek found that doubling the density of development in Boston would reduce vehicle miles traveled by only about 10 percent. Meanwhile evidence from the USDOT indicates that while vehicle miles traveled increased dramatically during the 1980s and 90s pollution actually decreased (primarily because of engine control). However, while smart growth has generated popular interest and some very attractive demonstration projects, its overall impact has been small.

What are the conditions that may stimulate attention to sustainability through land development planning for cities of the developing world? Some of these are:

- Rapid urban growth—because this means many locational decisions per year in which regulation could take more effect than in more slowly growing cities.

- Significant social fragmentation over space by auto users and non-auto users. In cities that are virtually universally motorized, as in the North, social fragmentation on these grounds may not be a concern, but in low-income cities where a substantial but limited population have cars, the isolation of the rest is a potentially serious political problem.

- Large amounts of peri-urban land in the ownership of interests that cannot—or will not—permit its development, generating leapfrog urbanization. This is particularly true in much of the developing world where religious institutions, government agencies, tribal councils, and the military own large tracts of land, or large holdings retained speculatively.

--A need for continued urbanization by local governments that receive a significant part of their revenue from the urbanization process, as in China.

--A need for serviced land for low priced housing. This applies to cities where a significant part of urban extension is by invasions and informal settlements.

--Acute scarcity of agricultural land. There are many countries where saving agricultural land is important because of very low rates leading to food dependency—Egypt, China, India, Haiti....

--Countries where proaction in the land development sector by government is a possibility. Examples will follow.

Land and Transport Planning for Rapidly Urbanizing Cities

Professor Schlomo Angel has developed a form of dealing with the problem through government proaction. He has dealt with cities in Ecuador secondary cities where the population is expected to double during the next 20 years and the urbanized areas will triple in size during the same period. Most of this new development will be informal settlements and invasions.

Left to the normal process these urban areas will expand with minimal shelters in hastily and informally created parcels. More foresight through the acquisition of land by government authority for infrastructure (available by entitlement without purchase) makes new settlements dramatically more accessible by public transport hopefully replacing polluting two wheelers. It facilitates construction of underground infrastructure and may eventually consolidate land development to higher quality.

The proposal is to lay out surrounding areas with modified grid patterns of rights of way about 26 meters wide and placed at one kilometer intervals. The design of this scheme for development was undertaken by professionals from various secondary Ecuadorian cities by sketching it over maps of existing urban development during a three-day workshop (see Figures 2 and 3 for examples)

Bangkok is a very rapidly growing city suffering serious problems of poorly sited development in areas where water retention creates problems and very serious problems of traffic congestion and air pollution. An MIT team proposed a solution in a plan for the metropolitan area that involved a different kind of indirect government initiative in land development. We proposed that the Metropolitan Administration select locations for new centers in a circle around the center of the metropolitan area. Then basic infrastructure would be built—roads, storm drainage—in preparation for urbanization. As long as no one urbanizes the land there would be no charges for the infrastructure. But when a developer arrives to sponsor private development that company would owe the metropolitan administration a portion of the infrastructure cost. This contribution would be put in a revolving fund that would be used to finance similar pre-development infrastructure at other peripheral locations. Under these circumstances the government is not intervening directly in redevelopment, but is definitively conditioning the location of it. These centers, of course, were chosen for being well connected by various modes with the metropolitan center and with each other. The sub center at Lat Kabang (see fig. 12) has since gone under substantial development. It is located near the new International airport and connected with the city center by highway and rail.

These actions may well make the role of government in guiding land development so significant as to have important environmental consequences. Our expectation is that unless actions of this kind are taken significant achievement is not likely. Traditional land use controls are not apt to work.

Meanwhile multiple forces are in play in most cities of the rapidly urbanizing world that propel disorderly sprawl. For example, in the case of the Chinese city:

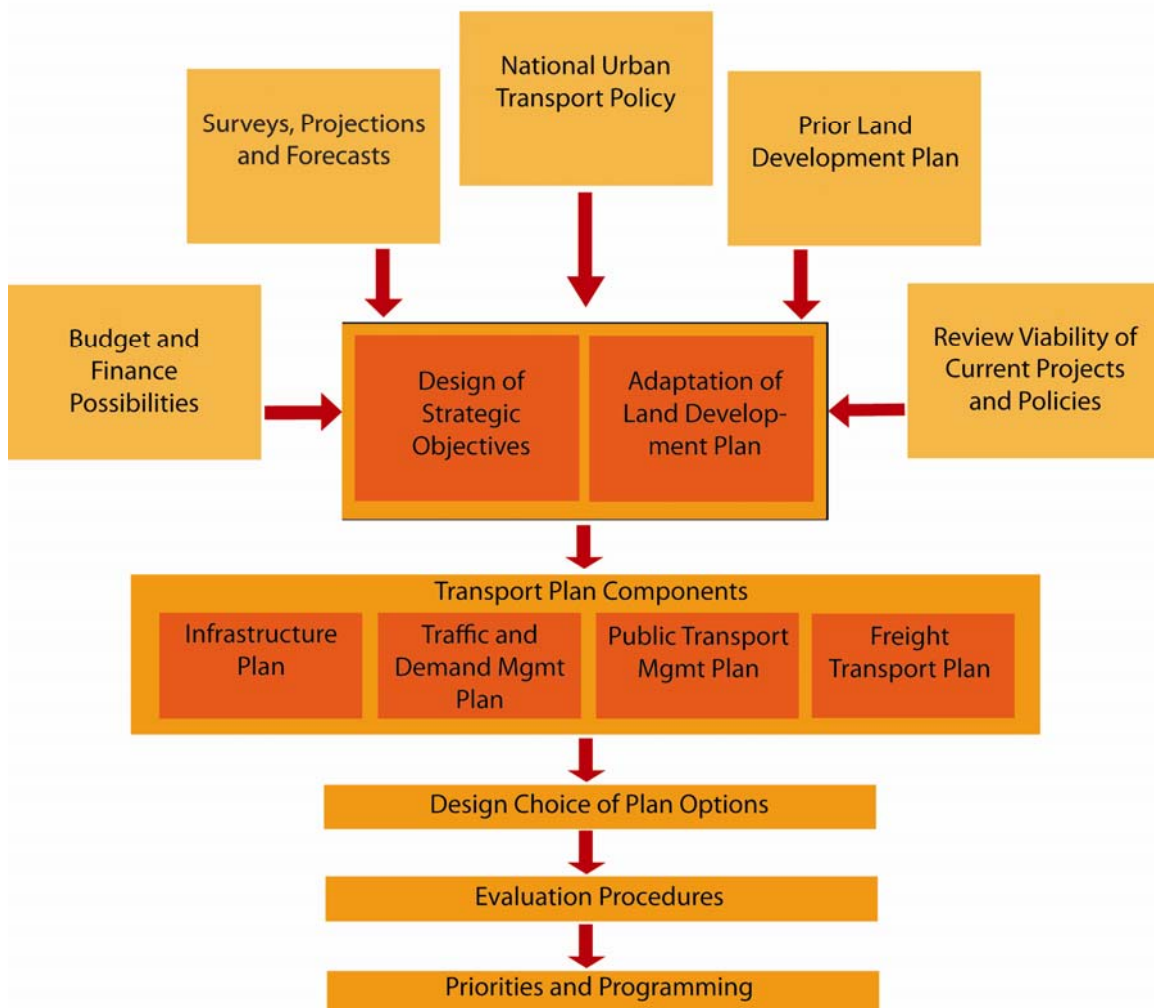
1. Urban plans for dedensification and satellite development, to overcome very high central residential densities
2. New intercity highway construction without land use constraints.
3. Breakup of state-owned enterprises, resulting in the loss of their housing, forcing residential relocation at the urban fringe.
4. Very large scale new housing projects that can find adequately large parcels only at the fringe (though the project site itself may be quite high density).
5. Continued acquisition and urbanization of land by municipalities, which, in the absence of local land taxes, need to do so to have a stream of annual revenue.
6. National Land Management Act standards requiring movement toward controlled average metropolitan densities
7. The new fee frameworks specifically placing money value on land in declining gradient from center to periphery, resulting in the decentralization of low rent activities from central locations.
8. Strong downtown business influences creating conventional central business districts, where land uses were formally more mixed, and included housing
9. Rapid urban immigration of floating population without city center residential options
10. And, of course importantly, rising incomes and auto ownership.

China, of course, is a special case. But ultimately, every city is a special case and points of these kinds appear in all of them. The conclusion is that by no means all urban decentralization is created by households using their increased income and auto mobility to seek spacious fringe housing. Fragmentary decentralization, sprawl, is caused by widely different forces incidentally aligned and needs to be confronted by a comprehensive planning approach.

Overview of the Full Planning Process for Urban Transportation and Environment

The whole process of planning for significant achievement in urban transportation planning is displayed on the flow diagram. Some of the important highlights are these.

Fig. 1 Process Framework For Urban Transportation Planning



--There should be a national urban transport policy that guides local metropolitan areas into significant achievement by offering them professional advice, standards for planning, financial assistance and other support. In the world of rapidly growing and motorizing cities very few of the national governments give any attention to this matter, regarding it as entirely a local matter. The cities, especially the secondary cities, cannot do it alone. There should be standards and advice for green transportation development.

--It is necessary to cope with the expectations of prior land use plans to make sure they meet the requirements of today's commitment to improve environment.

--It is important to be realistic about budgetary resources. Many cities dream of having a metro (at something like 100 million dollars a kilometer) while foregoing solutions that might make important difference.

--While the infrastructure planning is traditionally the part of the activity that receives the most attention, it is also important—perhaps more important-- to have a Traffic Demand Management Plan. This is the one that is mostly likely to make significant advances toward congestion and pollution relief. Many cities are already enforcing traffic restriction programs (Bogotá, Mexico City, Sao Paulo, Santiago de Chile....) and it is apparent that many are on the verge of enacting congestion pricing—probably the only really feasible way of significantly reducing emissions and congestion.

--Since the majority of trip makers in the cities under consideration are transit users, the attention to the management of public transport is a key element. This includes the reduction of duplication and other inefficiencies in the schemes that have grown across time without comprehensive planning decisions. It also includes considering new affordable modes, especially bus rapid transit. BRT is now exploding across the world, probably the most important innovation in public urban transport since the invention of the trolley car in the 1870s. These are buses on independent rights of way, with off-board

ticketing, wide doors (mostly left loading to medians) and transponderers that get them green lights at intersections. All this makes them much faster than ordinary buses, probably recovering the vitality of congestion besieged city centers.

Freight transport is very important to a struggling economy. Trucks are poorly provided with warehousing and transboarding facilities in most cities and often made to use selected roads through cities. Improvement of their effectiveness is very important, not only to the economy, but also to the environment since they are often guilty of a great deal of air pollution and greenhouse emissions.

The Motorized Two-Wheeler Dilemma

Motorized two and three wheel vehicles have for a long time been a great part of the traffic in East and South Asia, but they are now increasing rapidly in number and invading cities in other parts of the world, especially Latin America.

Two wheelers present a very awkward problem because they dramatically improve the mobility of modest income families on the one hand, but generate a great deal of pollution on the other.

Chennai and Mexico City show a dramatic comparison. Chennai (Madras) has barely more than ten percent of the per capital income compared with Mexico City. But then consider vehicle ownership compared between the two cities. Chennai has only 40 four-wheeled vehicles per thousand population, but fully 171 two wheelers. That is a total of 211 vehicles per thousand population. Mexico City has almost three times the four-wheeled ownership at 110 per thousand, but little tradition of two-wheelers, only 8 per thousand. The total for Mexico City, then is 118 motor vehicles per thousand. The astonishing result is that Chennai, on only about 10 percent of the per capita income of Mexico City is actually much more motorized than Mexico City.

This problem has been engaged by limiting two wheeler registrations (China), promoting bicycle use (Paris), introducing bus rapid transit and by other means. It nonetheless remains a serious quandary in environmentally and socially responsive mobility.

Expectations for the Future

Perhaps the most important things to expect from future decision-making are:

1. A focus on higher achievement actions in land use and transportation, now that we know the global warming threat is indeed a serious one. This will mean that the “good faith” actions proposed and enacted by many cities which, while directionally correct, are not achieving significant results, must be replaced by “what works.” This will include strident actions that have been resisted because of opposition by vested interests—especially congestion pricing. In most governmental settings, actions on land use change are likely not to be an important part of the strategy because cities don’t have sufficient authority over land use to make this sector significantly effective.

At the same time it may be important to keep in mind that token solutions to awesome problems can be significant inasmuch as they may (1) keep action on the problem in the minds of the citizens, (2) establish the seat of authority over the problem in the correct agency, or (3) serve as an experiment to check workability in the case of a breakthrough that makes possible the use of an action later in the case of increased authority to use it.

2. More attention to national urban transport policy in the governments of the developing world. This is necessary because (1) It is a way to break through stalemating local vested interests, (2) It responds to the fact that secondary cities are increasingly large cities but still do not have the strength of action as their national capitals.

There are indications that one of the outcomes of globalism is benefit to the largest cities and relative (or absolute) disbenefit to secondary cities. And with increasing size these secondary cities are emerging from the scale of urbanization where special innovation was regarded as unnecessary. At the same time they do not have the expertise, the borrowing power or the authority levels to generate new solutions. Some countries are already taking important steps in this direction, for example in developing programs to promote bus rapid transit in secondary cities (Colombia, Mexico, China...)

It is time to find high impact options to meet these daunting challenges.