

City Growth with Urban Sprawl and Problems of Management for Sustainable Urbanization

1. Introduction

1.1 Aims and objectives

Government Intervention is often required to guide urban development for achieving an orderly development of the different areas of the city so as to improve the quality of the city and the standard of life of the people. Various proposals for arresting urban sprawl and encouraging the planned and orderly development of the fringes of our metropolitan areas are receiving public attention (Bosselman, 1968). The current practice, generally, involve spatial planning to ensure the best land use, distribution of necessary urban infrastructure and services judiciously, proper implementation of the plan and smooth management of urban functioning of the services. In practice, all these matters are not achieved as they should have been. Consequently, the concept of urban sprawl-emergence of a situation of unauthorized and unplanned development, normally at the fringe areas of cities especially haphazard and piecemeal construction of homesteads, commercial areas, industrial areas and other non-conforming land uses, generally along the major lines of communications or roads adjacent to specified city limits, is observed which is often termed as the Urban Sprawl. The area of urban sprawl is characterized by a situation where urban development adversely interferes with urban environment which is neither an acceptable urban situation nor suitable for an agricultural rural environment.

Aruna Saxena (2008) describes the situation in her research paper as follows: The process of urbanization operating in the fringe has given rise to typical land use associations where the contemporary and dynamic land use pattern is developing side by side in the contemporary context, the various land uses. Old villages, new residential extensions, commerce and industry, city service and farming are not neatly sorted out into homogenous areas but are intermingled in a random fashion which gives a distinctive quality to the land use pattern of rural urban fringe. The haphazard development of slums, unauthorized colonies, piecemeal commercial development, intermixes of conforming and non-conforming uses of land coupled with inadequate services and facilities have become common features in the fringe. The dynamic change from rural to urban land use is so fast that the resultant need and complex uses coupled with shortage of land have led to the speculation and increase in land values.”

1.2 Main focus

Many individuals preferred to live in or near the urban areas because of availability of different means of earning livelihood in a more or less compact area and availability of necessary facilities for comfortable living in a consolidated area including utilities and services, shopping, recreational and cultural facilities, educational facilities, means of communications and movement. Urban areas developed either through objectively planned areas, guided and regulated by deliberate regulation and control systems or spontaneous growth through unplanned isolated constructions especially on the city fringes.

Ideally, the growth that takes place around urban areas should be channeled in an orderly manner that will produce an economically efficient, socially and personally satisfying living environment. In practice, ideal growth can hardly be achieved due to many practical reasons and difficulties including inefficiency and lack of timely funding of development projects, inefficient management systems, weak legal support etc.

1.3 Definition of the term `Urban Sprawl`

The term urban sprawl coined by William Whyte (1958) has developed through much deliberation and now can be given a reasonably precise definition:

'Urban sprawl is the growth of a metropolitan area through the process of scattered development of miscellaneous types of land use in isolated locations on the fringe, followed by the gradual filling-in of the intervening spaces with similar uses'.

'Urban sprawl, and the economic and regulatory systems which create it, not only produce an inefficient and unpleasant environment on the urban fringe, but adversely affect the inner city and the rural areas as well. (Bosselman, 1968)

1.4 Methodology

Methodology covers following a planning process of in-depth investigation of the causes and nature of the urban sprawl, its good and bad effects on the urban environment and the efficiency with which the remedial efforts that are managed. The process is likely to lead to guidelines for the actions to be taken to achieve sustainable development as alternative to harmful urban sprawl.

2. Creation of urban sprawl

2.1 Identification of the causes of urban sprawl

Conditions favorable to urban sprawl can be identified as follows:

- lower land price compared to developed areas of the main city
- availability of un-built agricultural land
- high rate of urbanization and rapid development activities
- availability of some municipal services in mixed development without paying for it
- less control on urban development being located outside the urban limit
- lower taxes on industries
- influence of speculators on the agricultural land owners for selling land to developers
- high rate of urbanization
- results of failure to match demand of urban infrastructure and services

2.1.1 Creation of urban sprawl along the main lines of communication

The more outlying areas contiguous to the city area going to be urbanized spontaneously in an unplanned way tend to grow very slowly. As a result the costly infrastructure facilities and services that have to be provided are under used and even lay idle for a long period.

2.1.2 Harmful effects on the fringe agricultural land and on the life of the residents

Encroachment of built up areas on the agricultural land rendering agricultural worker jobless or displaced to move to other areas for different occupation. The unplanned metropolitan growth has a number of serious adverse effects. Large areas become characterized by the initial scattered land uses so that balanced planning of the areas become impossible. The lack of planning is also reflected in the high cost and poor quality of public facilities serving the urban fringe areas. 'Land resources are also wasted because the land is divided in small parcels which are difficult to utilize efficiently (Bosselman, 1968)'.

3. Effective measures of avoiding urban sprawl for attaining sustainable urban environment

3.1 Need for use of new techniques

In order to deal with the chaotic conditions of unplanned development of the urban sprawl instead of using the traditional methods of management, new techniques of urban planning and management are required to be applied for effective actions to tackle the urban sprawl in the fringe areas of the metropolitan cities.

The problem of urban sprawl has been under serious investigation over time since the early decades of the nineteenth century. 'Beginning with Peter Kropotkin and Ebenezer Howard, a line of utopians, reformers and revolutionaries that included Lewis Mumford, Frank Lloyd Wright and Mao Ze Dong had visions of a city in the countryside' In pursuance of finding a new technique devised a model termed as a 'modular urbanization' (Friedman, 1993). His

model basically included units of self-governed city units planned with integration of provision of necessary urban services.

The model includes almost all aspects of the ingredients of functioning of the modular urbanization technique such as area, size of optimum population, necessary urban infrastructures and services, all whether network of road connections, solar power, small manufacturing industries, trade and commerce and a regional framework for a balanced economy. The model more or less conformed to well known 'New Town' concept but is lack in number of considerations which had doubts of success. For instance, unplanned isolated spots of development in an elongated spatial form along the main roads emanating from and depending upon the main city have difficulty in dealing with under the self-governed modular city. The working relationship with the main city may also be unmanageable. Once, restrictions on haphazard development is imposed under the pre-prepared physical development plans, rate of construction within the particular area of urban sprawl will be significantly reduced, and the migrants and opportunist developers will move to different areas for their operation. Therefore, the Friedman model is likely to face enormous obstacles in practice and as such limitations may make the model is less preferable technique applicable for successful management of the urban sprawl but as a non-traditional technique it may be useful in a modified form.

Another important technique which may be helpful to efficient urban planning and management of the areas under urban sprawl is the GIS information gathering and feed back system. Utilization of one such system was studied by Nigam, R. K. (2008), in the paper "Application of Remote Sensing and Geographical Information system for land use/land cover mapping and change detection in the rural urban fringe area of Enschede city, The Netherlands".

The paper states, 'Management and planning of urban space requires spatially accurate and timely information on land use and changing pattern. Monitoring provide the planners and the decision-makers with required information about the current state of development and the nature of changes that have occurred. Remote sensing and Geographical information system (GIS) provides vital tools which can be applied in the analysis at the district as well as the city level. The system provides detailed land use and spatial changes regularly which may assist the planner to effectively regulate and guide development in the urban management process.

3.2. Properly planned and developed compact city provide alternative to urban sprawl

There is little doubt that unplanned development must be replaced with planned development of the area concerned with orderly location and relocation of urban infrastructures and services. It should be noted that only proper planning will not solve the problems, efficient management including efficient regulation and control are essential for tackling the adverse effects of urban sprawl.

- administratively, regulation of the ever growing difference between the demand and supply of urban services worsens the situation unauthorized development in favor of acceleration of the process of increased formation of urban sprawl.
- environmental degradation due unplanned development: Unplanned development of the fringe areas leads to the lack of public facilities such as educational institutions, playgrounds, public open spaces, health centers, water supply, sanitation and drainage facilities.

3.3 Measures to prevent urban sprawl

Urban sprawl can be stopped only if scattered small scale development is replaced by the planning and development of large tracts of land on a comprehensive basis (Bosselman, 1968).

3.3.1 Problems and policy measures as identified by Saxena, 2008 are

- protection of prime agricultural land
- control of sub-urban sprawl
- control of growth
- provision of adequate services
- maintenance of life style in the face of growth
- jurisdictional, legal and financial limitations
- maintenance of environmental quality
- planned greenbelt but these can hardly be maintained. The controlling authorities have inadequate legal provision, skilled manpower, and priority action by the authorities stand on the way.

Bosselmam (1968), in the Report – Foreword and Introduction, 'Alternatives to Urban Sprawl' observed during 1960's that 'solutions to the growing problems of guiding urban land use in American cities may have to be sought through bold departures from the past practices'. He studied three approaches for the solution of the problem, namely

- Planned Development Zones, which call for intensive development at a prescribed minimum scale
- Compensative Regulations, which involve payments to owners whose property is subjected to highly restrictive regulations
- Public Land Assembly, in which the power of eminent domain would be used as a means of assuring orderly private development.

3.3.2 Planned Development Zoning

The concept of Planned Development Zoning is a substantial extension of the increasingly common use of special regulations for planned unit development, i.e., large tracts of land planned as a single unit. A Planned Development Zone would permit no intensive use of land except as part of a large-scale planned development. Development of small tracts would be permitted only if they were planned as an integral part of the overall development of a larger area. The zoning would be reviewed every few years and the land placed in traditional zoning categories at such time as the desirable trend of development becomes clear. Planned Development Zoning constitutes a major departure from traditional zoning techniques. But traditional zoning theories requiring a pre-mapped plan are based on existing statutes; these requirements can be eliminated by new state legislation (Bosselman, 1968).

3.3.3 Compensative Regulation

If any land use regulation is so restrictive that it would be held invalid by the courts as a taking of property without compensation, the Compensative Regulation technique would enable the authority of the governmental unit which established the regulation the opportunity to pay the landowner the difference between the value of his property subject to the over-restrictive regulation and the value of his property under some regulation which meets constitutional standards. If the governmental unit chose not to pay it could remove the over-restrictive aspect of the regulation. This system would allow the enforcement of the type of restrictive regulations that are necessary to prevent urban sprawl effectively.

3.3.4 Public Land Assembly

Large-scale Public Land Assembly technique can be used as a means of arresting urban sprawl and promoting balanced development on the fringe of metropolitan areas. The power

of eminent domain for Public Land Assembly may be exercised either by a public agency or by private developers under certain conditions. The expansion of the constitutional doctrine of “public purpose” indicates that the prevention of urban sprawl and planning of balanced development would constitute valid basis for the exercise of the power of eminent domain (Bosselman, 1968).

Major conclusions drawn were that the bad effects of to-day’s poorly controlled urban growth provide the justification for the adoption of various techniques which, in different circumstances, may have been unacceptable (with respect to the existing laws). The conclusions with respect to the three approaches were as follows:

- the advantages of subdivisions and new communities which are planned and developed on a large scale justify making sharp distinctions in permitted land uses according to the scale at which development will take place.
- regulations about the use that may be made of property which, standing alone, might be overly restrictive, can become a proper exercise of government power when accompanied by fair payments to the landowner,
- governments can properly use the power of eminent domain to assist in private land assembly, to more fully control areas around the public facilities, to prevent undesirable or premature development.

4. Planned urban development for sustainable urbanization

One of the most important independent variables of globally required sustainable urbanization is planned urban development. In the broad sense and long run, sustainable urbanization should take the following indicators into significant concern:

- process of urban planning
- components of sustainable urban environment
- definition and expected size of the city
- survey and assessment of the existing features of the city area
- development plan to serve national goals
- spatial planning and distribution of urban infrastructure and services

5. Case Studies – Dhaka, the Capital City of Bangladesh

5.1 Location

The Metropolitan City of Dhaka is located in the District of Dhaka in Bangladesh. Its central location in the country has considerable importance in the overall planning and development of the city. The initial city was established on a loop of land bounded by a perennial main river on the south, the river Buriganga and a branch of the river surrounding the other sides. The area in 1610 A. D, was five to seven square miles and total population was about thirteen thousand.

5.2 Nature of Growth of the City

The Metropolitan city of Dhaka is nearly four hundred years old. During the last four hundred years of growth of the city of Dhaka witnessed spectacular epoch-making changes. It is said that in 1700 A.D, population of Dhaka was more than that of London. Table 5.1 shows the changes of the population of Dhaka, increasing at certain period and decreasing in another although the areas kept on increasing with time.

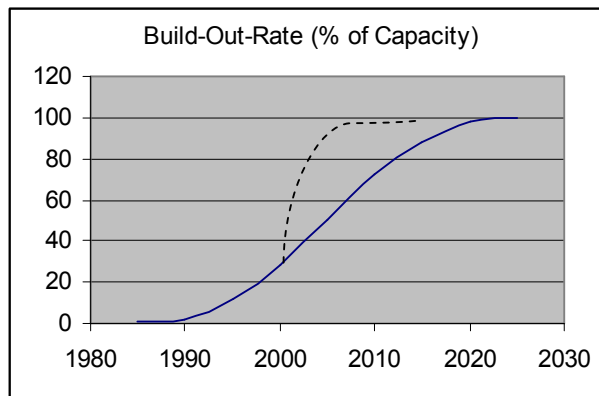
Table 5.1: Changes in Population of Dhaka

Period in A.D.	Status	Area in sq.miles	Population in thousand
Before 1610	Unidentified observation post		
1610	Provincial capital under the Mughal Empire of India	5-7	13
1641	Capital under governor Shaesta Khan	50	200
1811	Capital transferred to Murshidabad	50	83
1951	Provincial capital of Pakistan	28	335
1961	Provincial capital of Pakistan	35	551
1981	Capital of Bangladesh	289.3	3450
1991	Capital of Bangladesh	350	6950
2001	Capital of Bangladesh	590	9912

Source: Compiled by the author, 2008

At the birth of East Pakistan urban fringe areas in Dhaka started to grow rather slowly, but its impetus has been increased tremendously after the creation of Bangladesh. An initial study has been incorporated in the Dhaka Metropolitan Development Plan (DMDP), 1995 – 2015. The post established area from the year 1983 was treated the urbanizing fringe area in the DMDP plan. This is the area of land which was converted to urban use in the 1980s. It is widely scattered around most of Dhaka’s established urban area. It comprises one tenth of the 1991 urban area which supports almost 0.54 million people. However the developed area has taken place in a spontaneous, but haphazard way, leaving little way neither for an appropriate road network nor for basic infrastructure facilities and services. But haphazard development is undesirable for sustainable development. So, a direct policy is provided in DMDP (1995 - 2015) as “Policy UA/5 – Urban Fringe Development Acceleration”. A graphical representation is given below-

Figure 1: Accelerated development of the fringe areas converted to urban use 1983 - 1990



Source: DMDP, 1995

The policy proposed in the DMDP Plan appears to be not in line with the policy of urban development without urban sprawl. But however this has been in practice in the framework of planning due to lack of planners and regulatory issues in plan administrations.

5.3 Observation of Urban Sprawl and its Nature

The Metropolitan city of Dhaka provides a unique example to indicate how efficient spatial planning and development control regulation and management can regulate the urban sprawl to ensure sustainable urbanization without sprawl. It is found to be a representative example of the developing countries of the Southeast Asia.

It will be observed that at the early stage of the city growth under their Mughal Subedar, 120

Provincial governor under the Mughal Empire in India' during the seventeenth century, population started increasing fast from nearly 13,000 in 1610 and rose to 200,000 in 1640 A.D. The reason behind the dramatic growth was supposed to be facilitated by the prosperity in trade, commerce and industry due to increased activities of the Europeans and added efficiency in administration by the ruler. But the trend of progress did not last long. In 1700 A.D. population decreased to 100,000 persons and after shifting of the capital to Murshidabad, a place over 150 miles towards the north-west in India. In 1710 A. D. the population of the city started falling sharply. After taking over of the province of Bengal by the British East India Company in 1757, importance of Dhaka further reduced. After the Sepoy Mutiny (Solder's Mutiny) 1857 and taking over the country by the British Government, population of Dhaka city further declined.

Situation changed for the better after 1947 when the British left India and Dhaka became the Capital of East Pakistan. Mass migration took place. The population of Dhaka became 0.3 million within the area of 28 square miles. When in 1971, East Pakistan became the independent state of Bangladesh, the population of Dhaka started to sharply rise again. According to population census, in 1981, area of the Dhaka city was 289.3 square miles with a population of 3.45 million, in 1991 with an area of 350 square mile with a population 69.50 million and in the 2001 population census population of greater Dhaka city was shown as 9.912 million in an area of 590 sq. miles.

Looking at the urban sprawl situation, the different time picture of Dhaka shows that up to 1850, growth of population appears to be absorbed within the boundaries of the existing city area. After that date urban sprawl started gaining ground and after the mass migration to city after (1947) partition of India and establishment of Bangladesh in 1971, population of Dhaka could not be accommodated within the boundaries of the planned city area. The urban sprawl has taken unacceptable proportions. The detailed land use of the city of 2001 shows that urban sprawl along the main spinal road towards the north and along the road to the south east, was widespread. Besides unauthorized isolated settlements at he fringe areas adjacent to the border lines of the city created slum areas with all the harmful consequences of urban sprawl.

The satellite towns of Tongi (14 miles in the north) and Narayangonj (16 miles in the south-east) were in the process of development which was expected to absorb additional migrants to the city and contend urbanization and urban sprawl. Considerable gap between the main city and the satellite towns with rural agricultural land were expected to check urban sprawl of a continuously elongated pattern. Unfortunately, inappropriate urban planning and inefficient urban management failed to bring about success.

5.3.1 Causes

In-migration towards cities, due to lack of employment in the agricultural sector and displacement of people due to river erosion and frequent natural disasters produce high rate of urbanization. People desperately looking for shelter, job and urban services, tend to grab opportunities whatever they get. They look for the assistance of the government and public agencies for meeting their needs and demands. The Public agencies, on the other hand, hopelessly lag behind to rise to the occasion. Planned areas of the main city can hardly provide them space to settle except in the vacant land under the ownership of the government where they take shelter without authorization. Slum areas created. But most of them move to the urban fringe and settle down on the vacant agricultural land, mostly under the ownership of the government or under private ownership. Sometimes, vacant land which is relatively cheap, are purchased for the purpose of settlements. These settlements are found to be located near the main roads of the main city to take the advantage of the public services and utilities and adjacent to the border line of the city to take advantage of the natural source of water which may be available in the rural agricultural land. Such isolated

and unplanned settlements along the road in an elongated pattern form the urban sprawl in the city of Dhaka as well.

The process of formation of the urban sprawl encourage the establishment of housing mostly in the form of isolated homesteads and different sizes of various industries in an admixture of other land uses in the middle of agricultural land without necessary infrastructural base. 'As no single authority is responsible for overall planning and management of the metropolis, an extended metropolitan area with mixed urban and rural characteristics is a complex phenomenon` (Robinson, 1995; Aguilar and Ward, 2003).

Pradhan and Parera (2008) in their research paper "Socio-economic impacts and natural resources management conflicts in the urban fringe areas," with respect to the Mega-city of Bangkok, Thailand, probes into the conflict between development and the environment in an extended metropolitan area. The paper studies the relationship between urbanization, industrialization and the continuous exploitation of natural resources such as land and water resources, for non- agricultural use. Expanding human requirements and economic activities are placing ever-increasing pressures on natural resources, creating competition and conflicts. If in the future, human resources are to be met in a sustainable manner, it is now essential to resolve these conflicts and move towards more effective and efficient use of existing natural resources.

The research paper comes to the conclusion that land use planning and proper development management is the key instrument for effectively dealing with the urban sprawl. Two elements were suggested to be essential in the planning and management process. One is involvement of the stakeholders or public participation and the second is regular monitoring and feedback of data related information and efficiency of the regulation and control mechanism.

Similar situation arose in case of the city of Dhaka and similar steps may be helpful in efficiently dealing with the urban sprawl. The important implications of the unacceptable urban sprawl can be enumerated as follows:

- loss of agricultural land due encroachment of urban sprawl
- sub-standard urban development under urban sprawl
- lack of public utility services and little incentive for provision
- sustainable development is difficult once unplanned built up areas are proliferated irreversible changes taking place

5.3.2 Remedial Measures

Remedial measures involve three distinct areas of endeavors. Proper urban planning to be informed, new techniques to be devised for efficient development management and new methods to be applied in stead of the ineffective traditional methods along with strong monitoring and feedback systems. The three distinct areas are mentioned below:

- 1) appropriate urban planning to ensure planned development to prevent isolated spot developments
- 2) appropriate and effective institutional arrangement to ensure proper regulation and control of planned urban development
- 3) appropriate legal support to ensure proper guidance and control of development of the city and its fringe areas.

6. Past Performance and proposed Solutions

6.1 Preparation of Appropriate Urban Development Plans.

Spatial development plans were prepared for Dhaka metropolitan area in 1953, 1981 and in 1995 for Dhaka metropolitan area to deal with proper development of the city and ensure sustainable urbanization without sprawl. They were not effective. There were no mentions of

special conditions of the fringe areas in the first two development plans. In the third plan, unplanned development with deficiency of urban infrastructure and facilities were mentioned but in stead of suggesting measures to stop harmful urban sprawl, proposals were made for speedy provision of necessary infrastructures and services. The decision helped to expand the unauthorized urban sprawl further. There attention should be given to appropriate urban planning of the fringe areas.

Reducing encroachment of agricultural land by expansion of urban sprawl. It is generally accepted that the rich agricultural land around should be protected against urban development as far as possible. In the case of Dhaka city, urban sprawl has been grabbing the agricultural land around the city especially in the fringe areas. Effective urban planning and its implementation is the answer to such problems.

6.2 Institutional Arrangements to ensure Effective Management of Fringe Areas

6.2.1 Effective Management of the Development of the Fringe Areas

The traditional executive agencies for management of urban development failed to stop urban sprawl in the case of Dhaka. The following important causes and their remedies may be suggested as follows:

- Non-planners as head of the executing agencies relating to urban development cannot generally conceive of the appropriate policies to be adopted and as such problems cannot be properly handled. The remedy lies in placing the appropriate persons to the appropriate place.
- There are often disagreements among the relevant parallel agencies such among different administrative ministries of the government on policy matters relating to the development of the city and delays and disruptions in the development process ensues. This problem of management can be removed through placing the development agency such as the development authority directly under the office of the Prime Minister.
- Even under the autonomous agency for development, if created, should have a separate unit to look after the affairs of the urban fringe so that constant monitoring and feedback is ensured and unauthorized development in the fringe areas are checked and actions taken to deal with them. An effective system of co-ordination in development is essential for success.

6.2.2 Regulation and Control of the Development

Planning as well as Regulations and control are required. Simply preparation of a development plan leaves it in a normal process of execution has been found to be unworkable in dealing with the urban sprawl effectively. Therefore, innovative techniques of regulation and control should be devised and applied.

6.3 Legal Aid in Support of Effective City Planning and Management

Innovative Rules and Regulations are very much essential for fringe Area management. The problems occurring on the fringe areas due to urban sprawl, if analyzed in-depth, guidelines for adoption of appropriate legislative measures can be obtained.

7. Conclusions

Policy towards urban sprawl should include two things: (i) stream lining the existing condition aimed at removing harmful effects and (ii) taking steps for stopping urban sprawl process occurring in future.

7.1 Urban Sprawl is not checked by urban plans alone

One of the most important elements which provide opportunities for proliferation of urban sprawl is unplanned urban development. But urban sprawl cannot be checked by a pre-

prepared plan alone. Efficient guidance, development control and regulation must be ensured for the success.

7.2 Management of Development is the Critical element for Success

Land use control and regulation are important tools and instruments for planning of the cities and towns and to regulate growth and associated sprawl (Saxena, 2008). According to the author, to stop land speculation, especially on vacant land on the fringe of the city the following suggestions deserve attention:

- restrictions on premature conversion of agricultural land
- taxes on land transfer to check speculation
- the need for generation of digital topographical data base for various towns
- use of high resolution data for planning and urban information generation
- needs on the utility of high resolution data/GIS techniques in the preparation of District planning
- satellite based information system has flexibility to accommodate any new data and provides integration as well as updating
- training of manpower essential to adopt new technology of Remote Sensing and GIS in urban/regional planning
- digital database generation for cadastral applications
- promote use of remote sensing and GIS in urban authorities
- generation of data base for macro, mesa, micro levels tasks pertaining to regional, Urban and Zoning planning

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