

Potential Conflicts of Land Uses in the Implementation Processes of Master Plan in Dhaka Metropolitan Development Area in Reference to Tongi Area

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Abstract

Rapid urbanization along with a lack of control over the urban growth has adversely affected urban development resulting in undue pressure on available urban services and infrastructures in Tongi area. The land uses are changed due to rapid urbanization and population growth, rural-urban migration and inter-city movement of population. The land use is developed or transformed in an unplanned way and the unplanned growth has destroyed the shape of land use of the study area. The conflicts mainly occurred due to decreasing land value, the potential for a development to change the character of a neighborhood, the potential amenity impacts of a proposed development, lack of both trust and public involvement in the development process. Realizing these facts, the Detailed Area Plan (DAP) is prepared for sustainable urban development. But in reality, there are also some problems related to the provisions in DAP violating the structure plan prepared for DMDP area. Therefore, in the study, it attempted to make a comparison of existing land use and Detailed Area Plan (DAP) proposals and to find out the potential conflicts of land use changes in comparison with Structure Plan and Detailed Area Plan proposals in the study area.

Introduction

The spatial arrangement of incompatible land uses may cause land use conflicts (Steiner, 2008). Every land-use conflict is unique and emerges from site-specific social, economic, and ecological interactions (Campbell, 1996). Moreover, land use conflicts also occur in a political context since land use is highly regulated in most societies (Platt, 2004). A land use conflict occurs whenever stakeholders have incompatible interests related to certain land-use units. The incompatible interest results from negative effects emitted by the land-use unit (Bengston et al., 2004). Besides, land use conflicts are a concern for landscape planners, especially in peri-urban areas. Planners need to understand these conflicts better in order to make optimal decisions on land use allocations and conflict management. Such conflicts, however, are complex. A common approach for better understanding complex entities is to categorize them into a limited number of types (Dunka, et al, 2011). Due to accelerated social changes, regional economic variations and demographic movements, societies are experiencing urban dynamics with unexpected speed and complexity in the global and in the regional context. In the 21st century, urbanization has been the decisive driver of land use change. In the course of social dynamics, demands on land use are becoming highly differentiated and are transforming

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regions, resulting in the rising and expanding use of vacant areas, such as agricultural land and open spaces. This has led to a growing potential of land use conflicts in particular in regions characterized by high population density and growth (Rink, Banzhaf and Kabisch, 2011).

Population pressures in an urban area have led to environmental and socio-economic land use conflicts. To meet the demand of increasing population, facilities should be provided focusing on proper distribution of land uses in order to minimize the detrimental effects of land use change. Land use allocation involves making decisions on how to use available land to satisfy land users' needs (Voogd, 1983; Malczewski, 1996). According to Shortly and Marshall (2005), Changes in land use and land cover can have wide ranging environmental consequences. Since there are many land use stakeholders play the key role in land market, proper land use allocation should be made for planned and sustainable land use development so that it helps to meet the needs of all prospective land users while at the same time ensuring the natural resource base is protected (WCED, 1987).

Background of the study

In Gazipur City Corporation, Tongi area has established itself as an important town and one of the largest industrial areas in Bangladesh. The industrialization of the area influences the hasty migration of population. The land uses are mainly changed due to rapid urbanization and population growth, rural-urban migration and inter city movement of population. According to 2001 census, the total population of the area is 300715 and population growth rate is 3.72% (BBS, 2001). But, at present, the population is about 5, 00,000 (MIDP, 2008). Rapid urbanization over the last two decades, along with a lack of control over the urban growth and lack of financial and institutional resource have adversely affected development and environmental conditions, resulting in undue pressure on available urban services and infrastructures of the area. The land use is developed or transformed in the study area in an unplanned way and also created pressure on land to provide urban facilities such as infrastructure facilities and basic utility services to them. Urban facilities damage the agricultural landscape resulting conflicts related to municipal land management such as zoning permit, housing and permit of local activity zones (Torre and Darly, 2011).

Outside the industrial estate, the area is naturally developed and most developments are single storied katcha and semi-pucca structures. Tongi is located about 15 km north of Dhaka (DAP, 2008). The area has an overall area of 34.79 sq.km and consists of 15 wards (ward 43 to ward 57) in the Gazipur City Corporation (Field survey, 2013). The study area is generally the first choice for the industrialists to set up their industries. But the unplanned growth has destroyed the shape of land use of the study area. The conflict mainly occurs due to decreasing land value (Kotevska, 2001; Fischel, 2001). Another major cause of land use conflicts is the potential for a development to change the character of a neighborhood (Kotevska, 2001). The other reasons generating land use conflicts between most competitive land users are the potential amenity impacts of a proposed development, a lack of both trust and public involvement in the development process, safety, moral values, equity, politics and potential environmental harm (Awakul and Ogunlana, 2002). Most of the agriculture land at the western part of Tongi area is converted into various uses by land filling. Therefore, valuable agricultural land is lost. A

mixed development is currently taking place, which can create major constraints at the time of providing basic utilities and service facilities in the study area. Realizing these facts, the Detailed Area Plan (DAP) is prepared for sustainable urban development. But in reality, there are also problems related to the provisions in DAP violating the structure plan prepared for DMDP area. In the study, it is tried to find out the potential conflicts of land use changes in comparison with Structure Plan and Detailed Area Plan proposals in the study area.

Objectives and methodology of the study

The objectives of the study are to make a comparison of existing land use and Detailed Area Plan (DAP) proposals, to identify the potential conflicts of future land use changes in the study area and also provide some recommendations for effective utilization of land use in future. Both primary and secondary data are used to complete the study. Primary data is collected through field survey. Secondary data is collected from various books, journals, articles and reports about information on physical and demographic characteristics of the study area. The Structure Plan and GIS database of the Detailed Area Plan are collected from the Town Planning Division of Tongi Pourashava, now under the area of Gazipur City Corporation to identify the future land use change and land use conflicts in the study area. The GIS (Geographic Information System) tool and Microsoft Office software are used to analyze the land use conflict.

Comparative analysis of existing land use and DAP proposals

The existing land use and the proposed land use for the study area in Detailed Area Plan (Draft) proposals are analyzed to find out the percentile increase or decrease of variety of land uses.

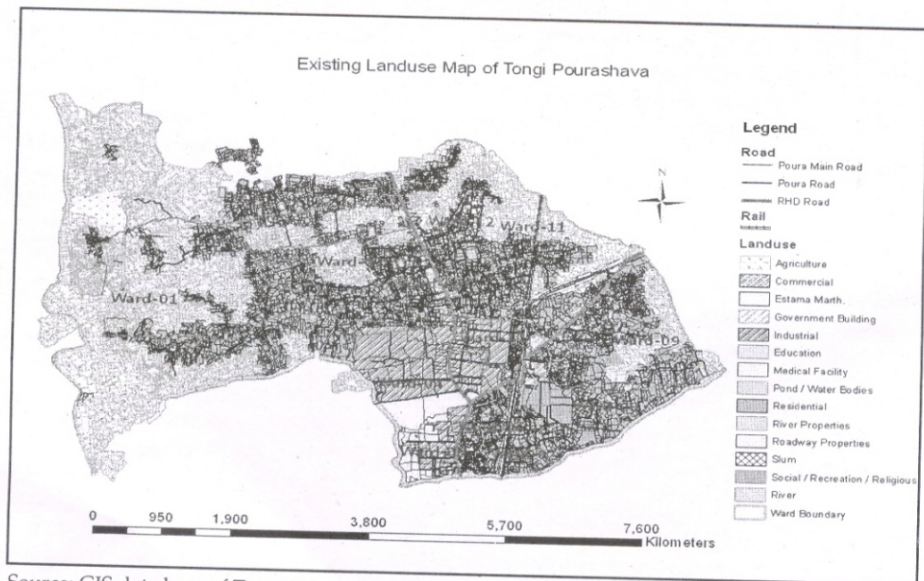
Comparison between existing and proposed land use

The total area of Tongi covers 34.79 sq. km. About 38.60% is agriculture, which is the dominant land use of the study area. In Detailed Area Plan, 21.2% of total land has been kept for agriculture purposes including main flood flow zone and agriculture with rural homestead. The percentile decreased of agriculture land is 17.4%. The existing residential area is 37.13%. About 38.6% of total land has been proposed for residential purposes, which is the most dominant land use in Detailed Area Plan (DAP). The percentile increase of residential land is 1.47% of total land. In DAP, the industrial land has been classified as a moderate hazard industrial zone and manufacturing industrial zone. The total area which is proposed in DAP for using industrial purposes is 9.2%. But in reality, the existing industrial area is 11.21% of total land. The land used for commercial purposes at present is 2.50%. The land which has been kept for future commercial uses (mixed use) in DAP is about 5.0%. The percentile increase of commercial land is 2.5% (Field survey, 2010 and DAP, 2008).

Table 3: Comparative analysis of existing land use with DAP (draft) proposals in Tongi Pourashava

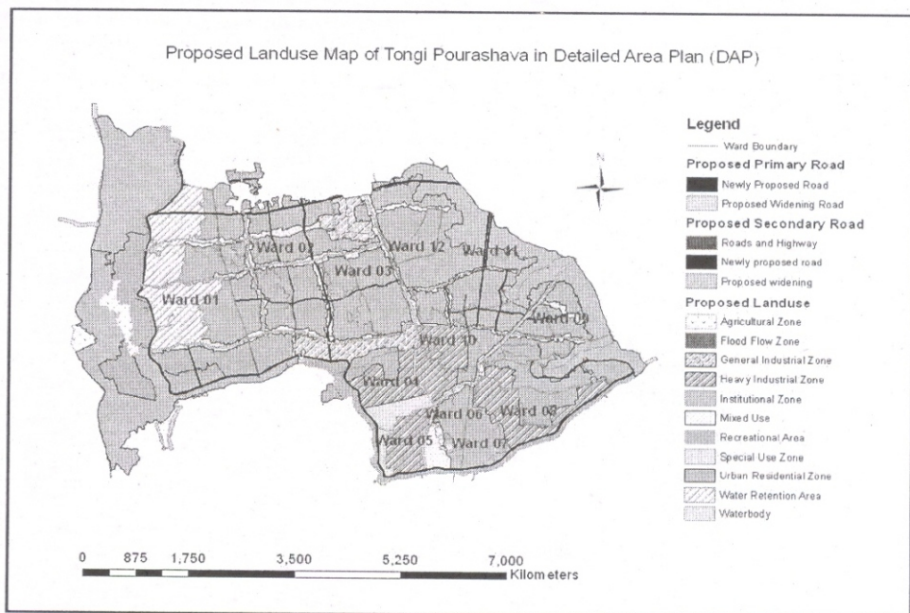
Existing land use	% of existing land use	Proposed land use	% of proposed land use
Agriculture	38.60	Agriculture with rural homestead	0.9
Residential	37.13	Residential	38.6
Commercial	2.50	Transportation facility	9.1
Industrial	11.21	Manufacturing industry	3.1
Education	0.75	Moderate hazard industry	6.1
Government building	0.49	Water retention pond	5.2
Estama marth	2.07	Mixed use	5.0
Medical facility	0.17	Water body	6.1
Pond/Water bodies	0.63	Low income housing	2.9
Slum	1.01	Special use	1.3
Social/Recreation/Religious	0.43	Open space	1.3
Roadway properties	0.52	Main flood flow zone	20.3
Railway properties	1.18	---	---
River properties	3.31	---	---
Total	100	Total	100

Source: GIS data base of Tongi Pourashava, 2010 and DAP, 2008



Source: GIS data base of Tongi Pourashava, 2010

Fig.1: Existing land use map of Tongi Pourashava



Source: RAJUK, 2010

Fig. 2: Proposed land use map of Tongi Pourashava in DAP

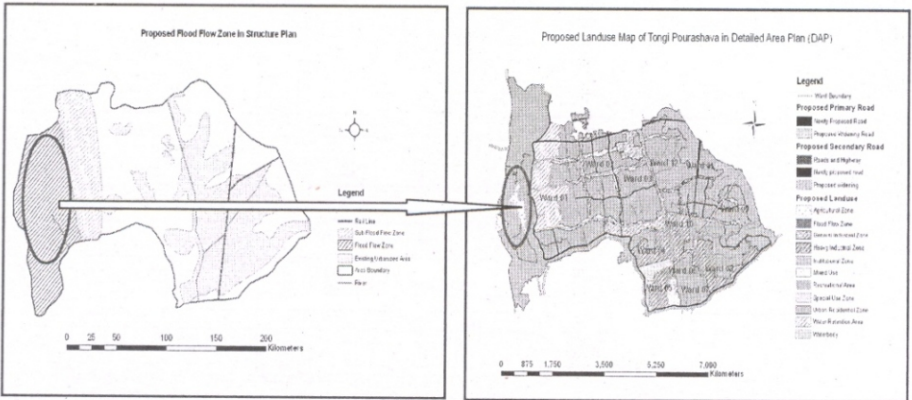
In Detailed Area Plan (DAP), about 2.9%, 1.3% and 1.3% of total land has been proposed for low income housing, special use (Estama Math) and open space respectively. The land proposed for using water body, water retention pond and transport facilities are 6.1%, 5.2% and 9.1% respectively (DAP, 2008). The existing land used for medical facility is 0.06 sq.km., where only 0.023 sq.km. of land has been proposed in Detailed Area Plan for providing medical facility. The land used for educational purposes is 0.26 sq.km at present. But in DAP, about 0.20 sq.km. of total land has been kept for future educational uses. The proposed land used for social/religious/recreational purposes in Detailed Area Plan (DAP) is 1.22 sq.km, where the existing land used for this purposes is 0.15 sq.km. The proposed land for social/religious/recreational purposes is 1.07 sq.km. (Field survey, 2010 and DAP, 2008). The comparison between existing and proposed land uses has been a difficult task due to difference in use categories. An attempt has been made in Table 3 to match the categories in order to find out the differences.

Potential conflicts of future land use changes

The study attempted to find out the potential conflicts of future land use changes compare with the Structure Plan, which is prepared for Dhaka Metropolitan Area up to 2015. There is a guideline to follow Structure Plan strictly for the concerned authority who are involved in DAP preparation for the selected area. Recently, the Detailed Area Plan (DAP) is prepared for Tongi area. The conflicts among Detailed Area Plan, Structure Plan and Existing Landuse are identified to minimize the conflicts in future land uses as best as possible.

Flood flow zone vs. residential area

In Detailed Area Plan of Tongi area, residential and recreational area is proposed in the main flood flow zone, which is strictly prohibited in the Structure Plan of Dhaka Metropolitan Development Plan (DMDP). Only in dry season recreational facilities are allowed in the flood flow zone. In the DAP, it is not clear what types of recreational facilities are proposed for the study area. Therefore, it will encourage land filling and create obstacles in flood flow, raise the flood water levels and change the flow direction. The permitted uses, which are proposed in flood flow zone are agriculture, dry season recreational activities, ferry terminals and excavation of mineral deposits including dry season brick works in order to avoid obstruction of flood flow.



Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008.

Fig. 3: Proposed flood flow zone in DMDP and proposed future land use map in DAP

Sub Flood flow zone vs. retention area

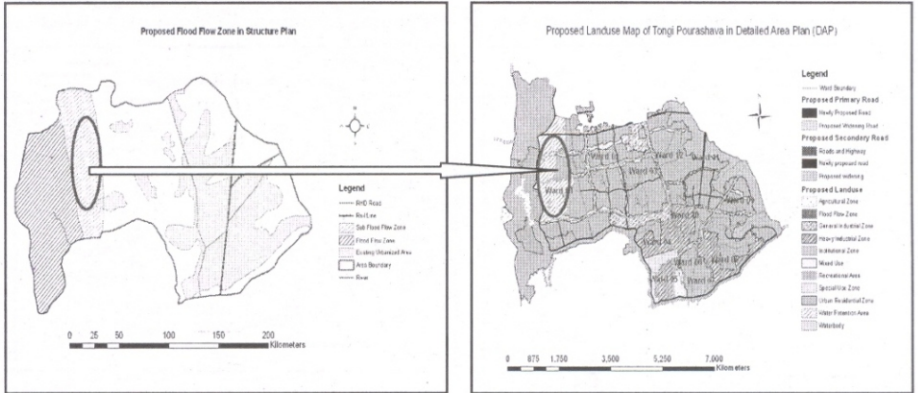
The area proposed as sub flood flow zone in the structure plan is shown as retention area in the Detailed Area Plan. The permitted uses in the sub flood flow zone are agriculture, forestry, brick fields, farm dwellings, flood management structures, recreation facilities (outdoor), public uses and structures etc. Development compatible with the rural nature of these are mainly rice growing areas permitted on condition that the structure are built on stills or on land raised above design flood water level or alignment of structures and raised land to be designed so as not to disturb flood flow (Structure Plan, 1995). Recently, some portion of this area is declared as industrial zone by the concerned authority. It will encourage land filling of low lying area to set up industry and create obstacles to flood flow.

Retention pond area vs. residential area

The retention pond area proposed in the structure plan is shown as residential area in DAP proposal. The retention pond has been proposed to ensure proper drainage system and to drain out the rain water from the study area especially in the rainy season. It is also needed to keep the area free from water logging. Utilizing the retention pond area as a residential area will create problem to drain out the storm water as well as excessive rain water. In DAP, retention pond area is also shown as flood flow zone. But, it will not create any problem at all.

New land development and area discouraged for development

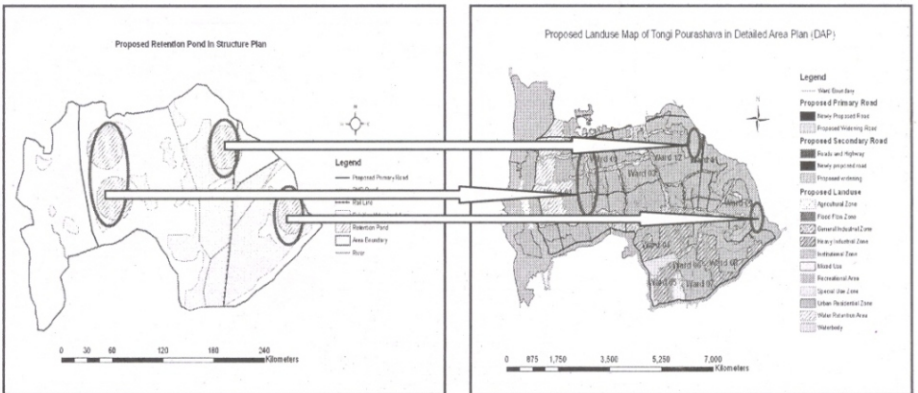
Tongi is a potential area for future expansion of Dhaka City. In the Structure Plan, there is a guideline for new land development for sustainable growth and best utilization of land resource up to the year of 2015. But, in the Detailed Area Plan prepared for the area, excessive development is proposed without following the guidelines of the Structure Plan. In the Structure Plan, some area is proposed as development discouraged area.



Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 4: Proposed sub flood flow zone in DMDP and proposed future land use map in DAP

In the Detailed Area Plan (DAP), this type of land is proposed as residential area, recreational area, flood flow zone and retention area development. The flood flow zone and sub flood flow zone could be in the development discouraged area but the residential development and recreational development is not allowed in this type of area because the land is primarily to be low lying which is kept preserved to avoid obstruction

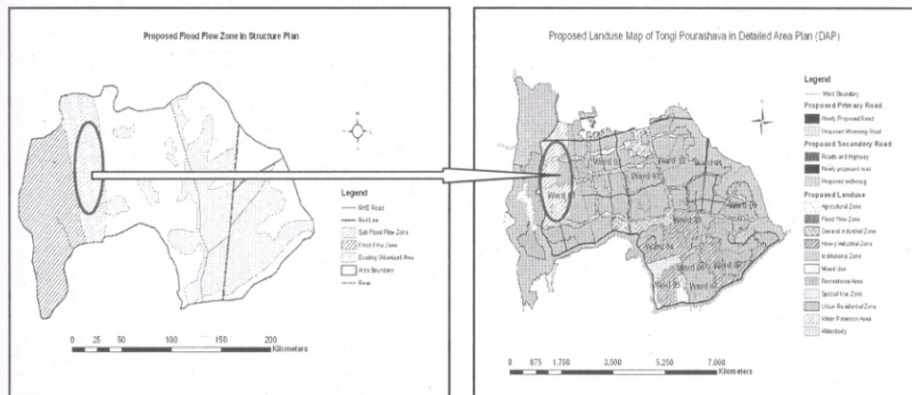


Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 5: Proposed retention pond in DMDP and proposed future land use map in DAP

New land development and area discouraged for development

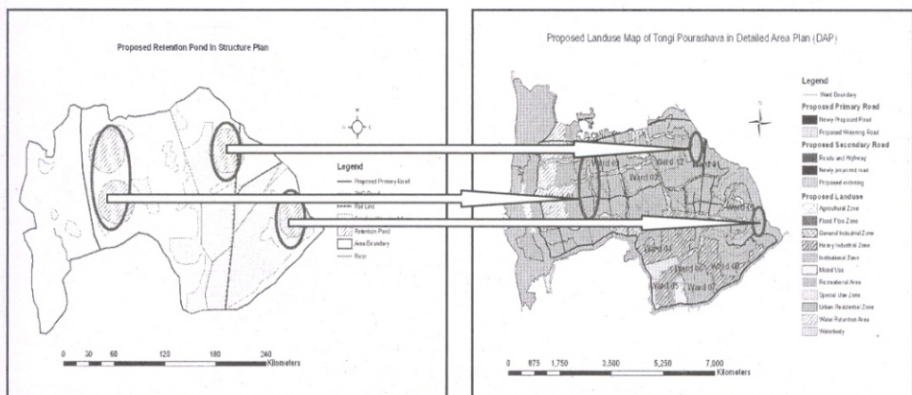
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Fig. 4: Proposed sub flood flow zone in DMDP and proposed future land use map in DAP

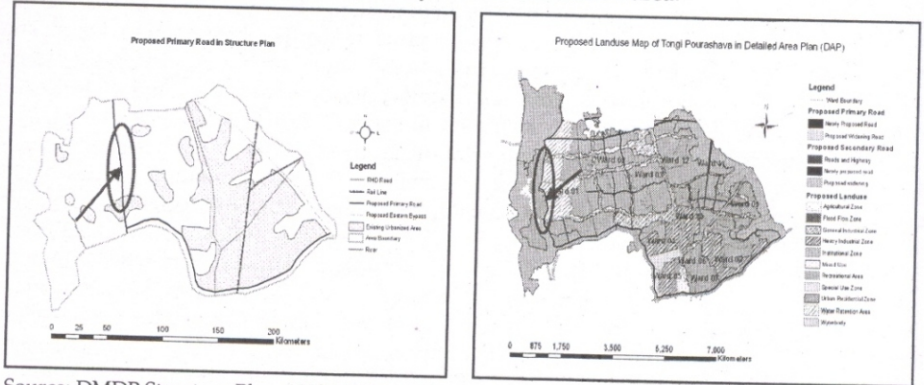
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Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 5: Proposed retention pond in DMDP and proposed future land use map in DAP

Because of this primary road, there would be a great chance to fill up the low lying land in future to use commercial, industrial and residential purposes. These types of development will create obstacles to smooth flood flow and proper draining out of storm and rain water. It is seen that there is gap of communication with the concerned authority at the time of preparing DAP for the study area. The primary road which is proposed in DAP is not placed at exact location as it is proposed in the Structure Plan. The sub flood flow zone is proposed beyond the primary road in the Structure Plan but in DAP, it is proposed inside the primary road as a retention area.

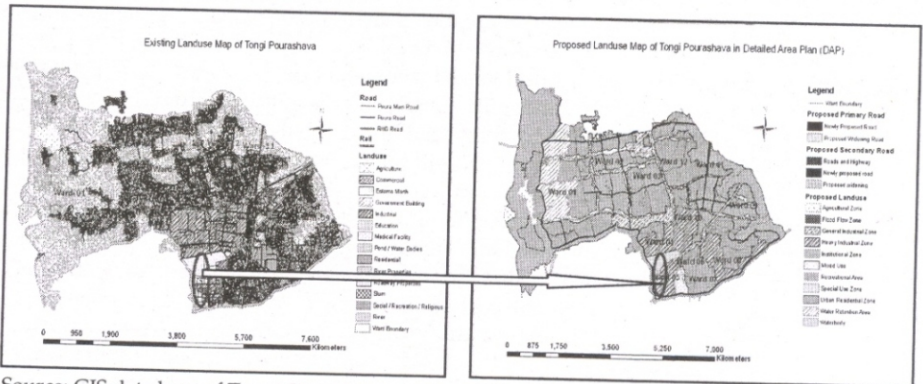


Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 8: Proposed primary road network in DMDP proposed future land use map in DAP

Special area development

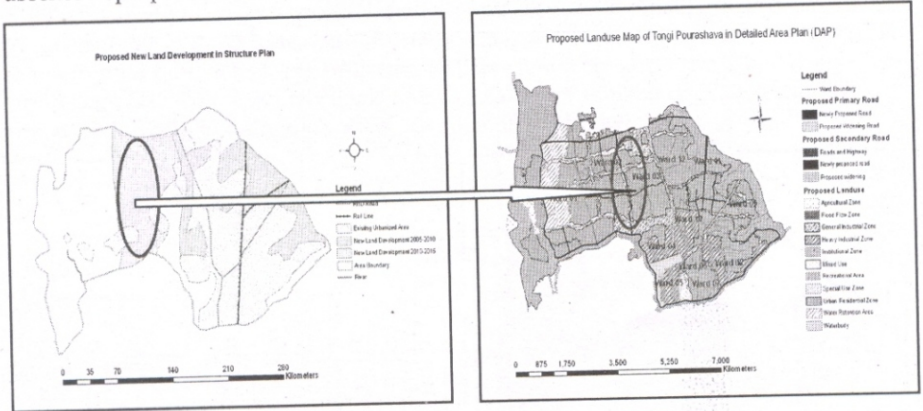
The special area should be preserved in future and need to be considered so that their respective functions and any future planned expansion are secured and unimpeded from uncontrolled urban growth or encroachment. But in Detailed Area Plan, some portion of special area (Estama Math) is proposed as industrial area, which is strictly prohibited in the Structure plan. There are clear guidelines to preserve special area in future development and not to use for any other purposes.



Source: GIS data base of Tongi Pourashava, 2010 and Detailed Area Plan (DAP), 2008

Fig. 9: Special area (Estama Math) shown in existing land use map and proposed future land use map

of flood flow. The sub flood flow zone is also shown as retention area in the DAP. In comparison with existing land use map, it is also shown that some portion of the sub flood flow zone is already declared as commercial area by the concerned authority, which will create conflict in future land use and encourage unplanned development in absence of proper land use zoning regulations.

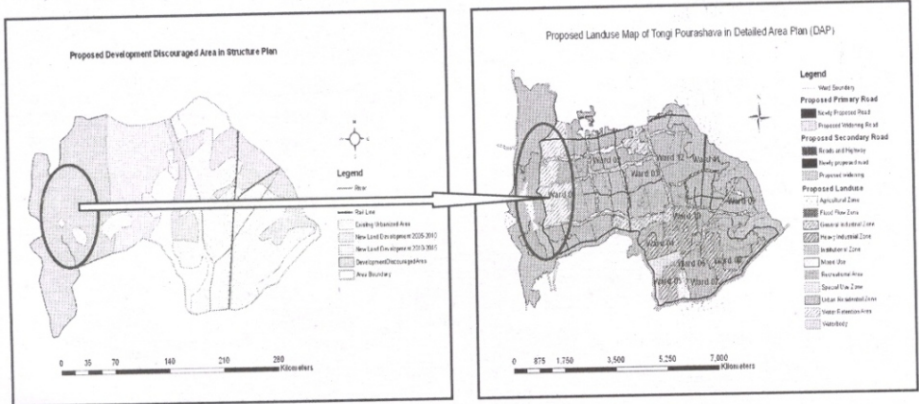


Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 6: Proposed new land development in DMDP and proposed future land use map in DAP

Placing error of primary road

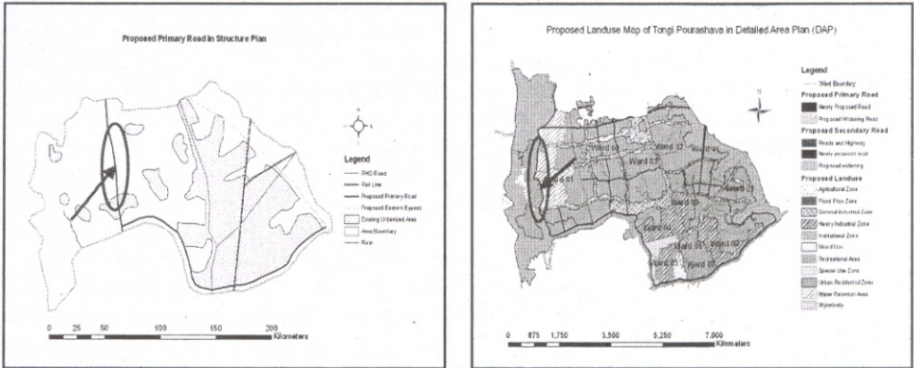
It is true that the land use is rapidly changed where the transportation network is well connected. A primary road is proposed in DAP besides the river and the proposed retention area. Recreational area development is also proposed in DAP besides the river.



Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 7: Proposed development discouraged area in DMDP and proposed future land use map in DAP

Because of this primary road, there would be a great chance to fill up the low lying land in future to use commercial, industrial and residential purposes. These types of development will create obstacles to smooth flood flow and proper draining out of storm and rain water. It is seen that there is gap of communication with the concerned authority at the time of preparing DAP for the study area. The primary road which is proposed in DAP is not placed at exact location as it is proposed in the Structure Plan. The sub flood flow zone is proposed beyond the primary road in the Structure Plan but in DAP, it is proposed inside the primary road as a retention area.

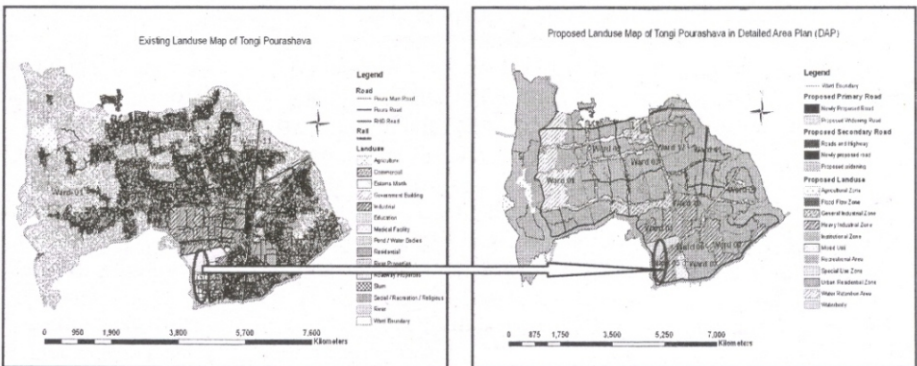


Source: DMDP Structure Plan, 1995-2015 and Detailed Area Plan (DAP), 2008

Fig. 8: Proposed primary road network in DMDP proposed area future land use map in DAP

Special area development

The special area should be preserved in future and need to be considered so that their respective functions and any future planned expansion are secured and unimpeded from uncontrolled urban growth or encroachment. But in Detailed Area Plan, some portion of special area (Estama Math) is proposed as industrial area, which is strictly prohibited in the Structure plan. There are clear guidelines to preserve special area in future development and not to use for any other purposes.



Source: GIS data base of Tongi Pourashava, 2010 and Detailed Area Plan (DAP), 2008

Fig. 9: Special area (Estama Math) shown in existing land use map and proposed future land use map

Structurally these changes are conflicting with the uses made in the structure plan of Dhaka Metropolitan Development Plan (DMDP). This has not probably been a judicious exercise on the structural readjustment in land use of the area. In future, such changes may cause a number of problems in maintaining infrastructural provisions for the area. Primarily this may create problems for both storm water drainage and flow of flood water during rainy season. Theoretically and practically isolation and conflict in land uses from Structure Plan provisions can not be legally welcome. On the other hand, any change without serious consideration to structural changes, may create an imbalance in the future development of the Pourashava and as well as other adjoining areas. The implementation of DAP thus may face difficulties. The concerned authorities should be aware of such conflicts in DAP, before embarking on its implementation.

Findings of the study

In Detailed Area Plan, about 21.2% of land has been kept for agriculture purposes and the percentile decreased of agricultural land is 17.4%. About 38.6% of land has been proposed for using residential purposes where as the existing residential area is 37.13%. The percentile increase of residential land is 1.47%. The total area proposed in DAP for industrial uses is 9.2%. But, at present, the existing industrial area is 11.21% of total area. The land used for commercial purposes is 2.50% and in DAP, the land which has been kept for future commercial uses (mixed use) is about 5.0%. The percentile increase of commercial land is 2.5%. In Detailed Area Plan (DAP), about 2.9%, 1.3% and 1.3% of total land has been proposed for low income housing, special use (Estama Marth) and open space respectively. In the study area, about 20.3% of land is proposed to keep as the main flood flow zone where agriculture is permitted land use. About 5.0% and 1.3% of land are kept for mixed use (retail, wholesale and shopping center, residential, industrial) and open space purposes. The land proposed for using water body, water retention pond and transport facilities are 6.1%, 5.2% and 9.1% respectively.

In the Detailed Area Plan (DAP), some potential conflicts of future land uses are identified in light of Structure Plan and Urban Area Plan. It is also compared with the existing land use pattern in some important cases. The potential conflicts are flood flow zone shown as residential area and recreational area, sub flood flow zone shown as retention area, retention pond area shown as residential area, new land development proposed outside of the Structure Plan, development discouraged area shown as residential area, recreational area and water retention area, placing error of primary road shown in Detailed Area Plan (DAP).and special area shown as industrial area. In some cases, it will encourage land filling which will create obstacles in flood flow, raise the flood water levels and change the flow direction. It will also encourage setting up industry in low lying area, make obstacle to flood flow, create problem to drain out the storm water and excessive rain water by utilizing the retention pond area as a residential area.

Recommendations of the study

In the study area, the agricultural land that has fallen into the main flood flow zone, sub flood zone and in some cases besides the Turag River should be conserved. Land development should be discouraged within the designated areas in the structure plan to avoid the obstructions of flood flow and change the flow direction. Besides, the retention

ponds should be kept for storage of water during raining seasons and flood. No land filling should be permitted within the designated retention pond areas in the structure plan. In addition, the area, which is allocated for special uses, should be maintained properly and their respective domain should be kept free from urban incursions. Moreover, proper emphasis should be given on underutilized, vacant and abandoned land or plots and considered under planning rules and regulations for utilization of these lands or plots. The policy should be taken timely to optimize the utilization of land converted to urban use and to promote planned development in the fringe areas and in the peripheral urban development areas.

Since mixed land use is found in the study area, the zoning rules and regulations should be strictly followed. In the study area, the agriculture land use is regularly losing its characteristics due to mixed land use development. In future, it will be very difficult to provide basic utility services and facilities as well as infrastructure in case of emergency. Use Zoning should be properly maintained to discourage unplanned and haphazard land use development. It should be updated and modified time to time to ensure a sustainable and livable environment. Land use clearance certificate must be made compulsory for all before changing the use of their land. If anybody does not take land use clearance certificate from the concerned authority, he/she should be imposed penalty. This will reduce the tendency for any type of alteration of land without taking permission from the concerned authority. It will also be helpful to guide the future land use to ensure planned and sustainable development within the study area. But, the authority currently practices to give land use clearance certificate for commercial and industrial development. Sometimes, it is also being violated for political pressure. Land use clearance certificate for residential development is not being followed by the authority. This will lead to unplanned and haphazard development in future. So, Land use clearance should be practiced at all levels of changing land uses.

Conclusion

Linear development is found in the study area. A linear pattern of growth is taking place in a haphazard manner. Irresponsibility of RAJUK and other related development authorities are the main causes of this haphazard growth. Lack of land use policy, zoning regulation and other controlling rules and laws are also responsible for this uncontrolled and unplanned development. Besides, mixed use always creates problem in the area. Moreover, land use in the center is not well guided. If the unplanned and haphazard growth can not be controlled as soon as possible, it will be threatening for the sustainable development of the area in future. The area does not have any guideline for residential or industrial development. Lowlands are being filled up very rapidly. This causes environmental degradation. For this, guided development is necessary for future land use development. It is recommended that each and every development should occur according to the land use plan. A national sub urban land use planning policy with involvement of concerned agencies is needed to be constituted for policy formation, effective coordination and guidance. A local level land use planning and implementing body is also needed to be set up in this area. It is required to determine the land use change in this area on a continuous basis and control the unplanned use of land by proper implementation of zoning rules and regulations. Recently, the Detailed Area Plan is prepared for the study area. But, there are also some problems of land use provisions

not to follow properly the Structure Plan and Urban Area Plan. The growth management measure proposed in the study should be implemented strictly to minimize these conflicts and sustainable development of the area.

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