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Land Readjustment as an Instrument for Governing Megacity's Urban Sprawl and Ecologically Critical Areas: A Reflection on the Experimental Upshot from Bangladesh

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Abstract

Dhaka, the capital of Bangladesh and 8th largest mega city in the world, is the home of more than twenty million people with its sprawling slums and dense suburban areas. Ecologically critical areas like agricultural land, wetland and other water bodies in the urban fringe areas are quickly vanishing from the landscape of Dhaka city to meet up the overarching demand of growing urban population. Land readjustment (LR), an urban land use management technique is widely used for carefully handling the development of fringe areas which are potentially ripe for new urban expansion at no or minimum cost to the government. In view of the above, this research has tended to focus on the aptness of Land Readjustment techniques for orderly urban expansion and fringe area development of Dhaka city along with the aim of conserving ecologically critical areas. The study used data both from primary and secondary sources to accomplish the purposes. The study argues the role of Land Readjustment technique in ensuring issues vis-à-vis integration of social security, economic feasibility and disaster risk reduction while tackling the great sustainability challenge for reshaping the city.

Introduction

Right to adequate shelter is a constitutional basic human right, whereas morbid slums and squatters with trivial rudimentary amenities accommodate the lion's share of the population in Dhaka city. High population density and persistent poverty compel large numbers of people to live in the marginalized areas in the outskirts of the city. Rapid and unplanned urbanization have fueled the process of urban sprawl and have posed extensive pressure on urban land management in the city's core as well as in the outskirts. The decease of wetlands around Dhaka to make room for growing urban population has however put a high toll on the environment and thereby made the city more vulnerable to flooding and other natural disasters. Urban land use management processes, such as land use planning, development controls and urban redevelopment offer opportunities for plummeting disaster risk. However, a flawless urban land management tool addressing the adequate supply of land for further urban development, integrating land use planning with disaster risk reduction and thereby conservation of ecologically critical areas like wetlands, agricultural lands etc. concurrently are more likely to accomplish an optimum elucidation to all of these glitches.

Land Readjustment (LR) is a widely used tool for the coordinated land assembly management and water body preservation in the suburban areas which are potentially

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ripe for new urban expansion with minimum or no public expenditure. It helps to cope with the problem of spontaneous and haphazard growth of residential settlements combined with the preservation of wetlands in urban fringe areas. The land readjustment (LR) method is applied efficiently and successfully in developed countries like Japan, Germany and France as well as in developing countries in the Far East (Turk, 2007). Asian cities are also experimenting various forms of land readjustment. It was widely used in the recovery of South Korea cities from the devastation caused by the Korean War, as well as by Japan in the rebuilding of its urban areas after the massive aerial bombings of World War II. Both countries and their urbanization processes are closely associated with the development and deployment of land readjustment. In inner-city and urban fringe areas of both countries, this unique land management technique is increasingly becoming relevant (UNHABITAT, 2016).

Accordingly, the research work is concentrated on investigating the efficacy of Land Readjustment technique in planned development and safeguarding of spaces for public facilities, ecologically critical areas etc. in the eastern fringe of Dhaka city. The particular area under consideration is one of the most vulnerable areas encountering acute urban sprawl in Dhaka city, thereby the challenges faced and experiences gained herein from the development activities in this area can easily be replicated to the lingering fringe areas of this city scape.

Land Readjustment Technique: A Brief Outline

Land readjustment is a technique for managing the urban development of urban-fringe lands, whereby a group of scattered and irregular land parcels including agricultural land, wetlands are pooled and assembled for their unified planning, servicing and subdivision as a single estate, with the sale of some of the new building plots to recover the costs and the redistribution of the other plots back to the landowners (Archer, 1999; Larsson, 1993). The concept of land readjustment was initiated by President George Washington in 1791. A legal framework was first introduced with the Lex Addickes in Frankfurt-am-Main, Germany, in 1902. Now Different forms of land readjustment exist in many countries including Germany, Japan, Taiwan Province of China, Republic of Korea, Western Australia (land pooling), India (plot reconstitution) and Indonesia (Yomralioglu, 1993). In the developing countries of Asian subcontinent where land prices are reaching exorbitant levels and both formal and informal land markets are increasingly aggravating social exclusion, land readjustment has emerged as a viable tool to enable public and private partnership in land development. Indeed, cities in countries like Japan, Korea, Turkey and India have already developed significant experience in land readjustment practices (UNHABITAT, 2016).

In general, the conversion of urban fringe lands from rural to urban uses usually takes place by the separate subdivision of the separate landholdings and is subject to the problems of scattered land and building development, poor subdivision design, backlogs in the provision of public utility and road works, land shortages, excessive land speculation and high land prices. Land Readjustment can reduce these problems (Doebele, 1982). It can improve the process of land subdivision for urban development through unified planning, servicing, subdivision and redistribution by a government authority itself. The foremost objective of this very technique is to produce wealth and to

generate opportunities for the society to access the services of the city and also to safeguard the environment alongside the rights of existing land owners (Sorensen, 2000). Each land readjustment project can be seen as a form of compulsory participation and partnership agreement between the landowners and the planning authority. Generally, the landowners contribute a portion of their land financing the cost of the project. The amount of land contribution is proportional to the expected land value increase due to the implementation of the project. The planning authority provides the necessary technical expertise for the planning and implementation of the project. Public facilities such as roads, parks, sewerage, shopping centre, educational institute and open spaces are created and/or improved and individual sites are made easier to use (Archer, 1987). Land readjustments projects can be very attractive for both the land owners and government authority, because it brings about enormous economic, social and environmental benefits to the users. Urban land readjustment procedure can thus be considered either as a method for urban land development (by landowner) or as a tool for planning implementation (by society). The area selected for Land Readjustment should be physically and economically feasible for urban development.

Research Methodology and Data

The efficacy of the LR method in managing urban sprawl can be investigated by means of its technical, social, economic and financial efficiency in accomplishing the vision of planned urbanization. The ways include measuring the efficiency of the technique in land assembly and public service management, cost recovery, protection of social, economic, financial interest of the land owners and obviously in preservation of ecologically critical areas. The proficiency of LR method in the study area was examined through a myopic lens over a dummy project conceptualized herein encompassing relevant planning standards in Bangladesh and other necessary considerations to accomplish the research objective. Furthermore, technical, social, economic and financial feasibility analysis of the project propels the justification of the efficiency of this unique land management method under consideration.

This particular study is based on the data collected both from primary and secondary means. The survey was completed between May and September 2013. Primary database alike existing land use, structure type and transportation network of the study area was collected through field observation. The market value of the plots was collected by interviewing corresponding key informants as Ward Commissioner of this area. The secondary data was collected basically from the latest detailed area plan for Dhaka city, gazetted in 2010 (Archer, 1987). Secondary information includes land use inventory as plot size and ownership of the plots of the study area. In the determination of adequate public facilities, such as roads, parks, sewerage, shopping centre, educational institute and open spaces, for the proposed Land Readjustment project in the study area, Bangladesh National Building Code (BNBC, 2006) was followed (RAJUK, 2004). Finally, to ensure proper and efficient management of the project, the total project work was proposed to be completed in three consecutive phases along with the provision for the development of some policy and planning proposals for further smooth operation.

Study Area at a Glance

This study is concentrated on the eastern fringe of Dhaka city, *Satarkul, Bhatara and Sutibhola* areas which are under location 10 of Detailed Area Plan (DAP). The study area is nearly 11 km north-east of the zero point of Dhaka, beside *Balu* river which is presented in Figure 1. There exist an enormous amount of agricultural land, water body and open space in the study area.

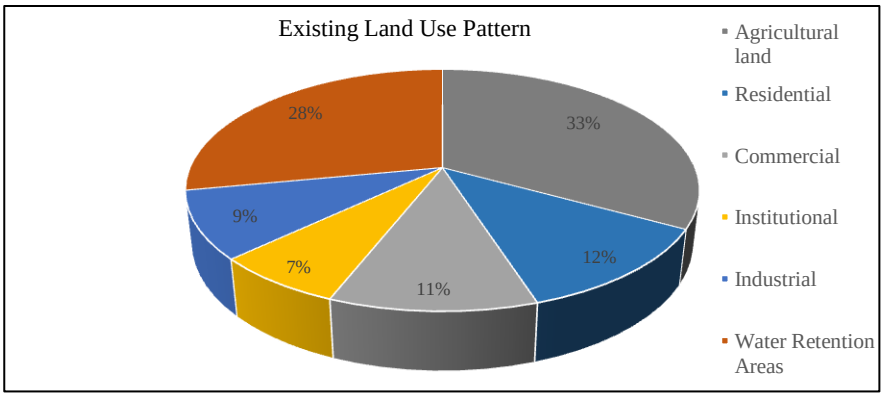
Source: LGED, 2013

Figure 1: Map of the study area

The total study area is about 3466.46 acres but the project area comprises 2165.66 acres excluding agricultural and wetlands within the study area (Archer, 1987). It was still an underdeveloped area and most of the existing landholdings are small, fragmented and have a great potentiality of massive future development. So, theoretically the area is apt for applying land readjustment technique. Furthermore, with the help of this technique, it is possible to conserve these ecologically critical areas from haphazard and unplanned development and thereby controlling urban sprawl effectively. The preserved river and *khals* within the study area can serve the purpose of a natural transportation network correspondingly.

Existing Land Use Inventory

The major land uses observed in this area can be categorized into agricultural, commercial, industrial and Water retention areas. Major commercial activities of the study area consist of road side informal bazar, workshops and retail shops. Different light industries that exist in the area include saw mills, poultry farms and other manufacturing and processing industries. Institutional settlements include school, collage, madrasha, mosque, temple, club center, community centers, co-operative offices etc. Figure 2 reveals that major portion of the study area is vacant land comprising agriculture and water retention areas.



Field survey, 2013

Figure 2: Existing land use pattern of the study area

Almost all of the plots are of irregular shape and the sizes vary from less than two *katha* to more than hundred *katha* throughout the study area. Plots above 10 *katha* are used normally under agricultural lands or water retention areas. *Pucca* structures constitute the major proportion of existing built structures in the study area with a few number of *semi-pucca* and *katcha* structures observed during the field survey in 2013. Private individual property constitutes significant proportion of the existing ownership of different land uses in this area (about 75 percent of the total ownership) and the rest are mainly *khas* land. The water bodies, like water retention ponds, *khals* etc. fall under *khas* land category. The existing land price of the study area was not so much higher as compared to the rest of Dhaka city. Land prices vary from thirty to forty five lakh Taka per *katha* in this area (Aman, 2013).

Existing Road Network and Communication Facilities

The study area was not well developed with adequate and integrated road network and communication facilities with the rest of the city. The site is just beside Dhaka-Mymensingh highway and connected with the CBD through a major thoroughfare namely *Progoti Saroni*. The internal road connection in the study area was not satisfactory yet. The access roads in the area are made of burnt bricks or mud and the road width varies between 10 to 15 feet. Para-transits like maxi, CNG, small bus etc. and NMT (Non-Motorized Traffic) like rickshaw, van etc. were mainly operated within this area as a prime mode of communication for people. But during the rainy season, the area under consideration, is accessible mainly by boats as most portion of the area goes under water.

Project Vision, Planning Proposals and Policies

The vision for the proposed Land Readjustment project in the study area was basically to provide basic public infrastructure facilities, rearrange the land holdings into regular building plots and conserve maximum number of ecologically critical areas of the region. The area is mainly proposed to be developed for residential purposes along with a mix of commercial facility that will support daily life of the people, like kitchen market and corner shop. The planning vision was to develop the area as a self-sustaining satellite

city. A commercial hub, the central focus of the area is proposed to act primarily as the commercial and administrative hub of the area. To create employment opportunities of the inhabitants of the area, an industrial park is proposed along with certain standards for worker housing and all necessary community facilities. It consists of agro food processing industries. To provide proper medical facility to the people of whole Dhaka city a medical college and hospital like Dhaka medical college is proposed to be constructed in this area. The Satarkul *khal* can be regenerated for transportation and recreational purposes and a promenade of 15 feet width was proposed along this *khal*. Retention Ponds, Canals and other water bodies within the area can be inter-connected for proper flood management. Fish farming, water based sports and boating service would be provided to serve as water based recreational facility for Dhaka. It will create employment opportunity for the people in the study area. The agriculture land will be strictly restricted from conversion into non-agricultural use and will be preserved for urban agriculture as per National Agriculture Policy, 2000 of Bangladesh. Seasonal farming of crops, vegetables and fisheries will be encouraged. Incompatible and environmentally harmful commercial and Industrial activity (e.g. Tannery, Brick Field etc.) will not be allowed in the project area. The existing light industries as timber and saw mill will be kept operating in the study area. There is a scarcity of playfield and park for active and passive recreation of the people of that area. So provision for open spaces in each neighborhood unit will be ensured as per private residential land development act, 2004. The project will accommodate nearly7, 57,943 people.

Planning proposals and associated policies for the proposed LR project in the study area can be grouped under two distinguished heading as discussed here.

Operating Principles and Policies

All water retention areas within this area will be preserved as per water body and wetland conservation act, 2000 of Bangladesh. Public authority (RAJUK or local govt.) will implement the project with consent from at least two third of the land owners of the area. Public participation will be encouraged for proper maintenance of the project. It can be done by giving priority to the existing inhabitants of the study area in the job opportunity of the project. For proper cost management of the project, the total project will be completed in 3 consecutive phases and contribution ratio will be 40%. Government will bear all initial cost aiming at minimizing the profit. Land for public spaces will not exceed 30% of the project's total land area as per private housing policy, 2004.

Design Principles and Policies

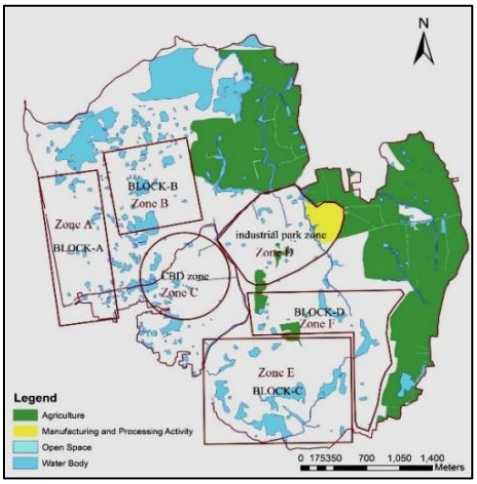
Neighborhood design concept is applied as a central theme for the planning of the study area. Each neighborhood is designed for a threshold of 10,000 people. Modified Grid iron patterns are used for the detailed land subdivision planning within each distinct neighborhood unit. Primary and nursery school are located within reach and optimal safety is ensured for children going to the school. Primary and nursery schools are located within walkable distances, maximum 0.5 to 1 miles from the houses in a neighborhood. Maximum safety was ensured for school going children as they have to cross maximum two access roads on their way to school. Facilities like school and playfield are proposed to be located at the approximate central location of each

neighborhood. Primary roads will be of 80 feet widths. Access roads within neighborhood will be of 25ft size and pedestrian precincts will be of 15ft width. Apartment blocks consist of different sized plots and residential flats varied from 1000-1500 square feet in size. Block-A will consist of plots of 5 and 10 *kathas* in size and block–C will consist of plots of 15 and 20 *kathas*.

Zoning Sub-division

Zoning policy will be implemented for ensuring efficient land use planning of the study area. The study area will be subdivided into 6 zones considering surrounding land use pattern namely Zone A, Zone B, Zone C, Zone D, Zone E, Zone F. Zone A is also known as "Block A" and this zone contains plot size of 5 and 10 *kathas*. This zone is located beside the *Progoti Saroni* road. The concept of giving this zone in this area is to equate the land prices comparing to the "Zone B" containing plot size of 15 and 20 *kathas*. The road side development would have greater market price of a land. In "Zone B" apartment of 1000-1500 square feet is made for the people who have land size below 5 *kathas* after 40% contribution of land. It is located beside agricultural land area. So people would have the opportunity to cultivate agricultural land as their secondary job.

"Zone C" is the Central Business District (CBD) of the study area. This zone mainly acts as a commercial and administrative hub of the area. "Zone D" is designed as an industrial park for the area. It is mainly proposed as agro food processing industry zone. As there is lots of agricultural land, so production of agricultural foods from that agricultural land may be processed in the nearby industry. "Zone E" is also known as "Block C". This zone will also consist apartment block. This zone is located beside the industrial park. So the working people in the industry may get the housing in this zone. "Zone F" is also known as "Block D" and this zone contains plots of 15 and 20 *kathas*. This zone is located in the periphery of the study area. As there is lots of vacant land in this area, that's why "Zone F" is located in this area. Figure 3 exhibits the location of different zones within the study area.



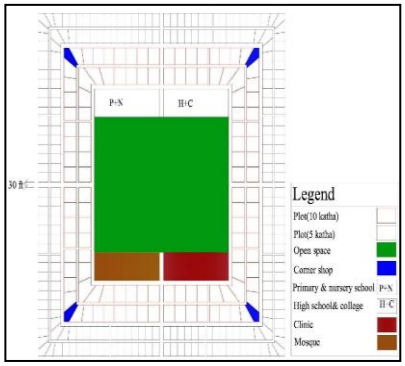
Source: DMDP DAP, 2010

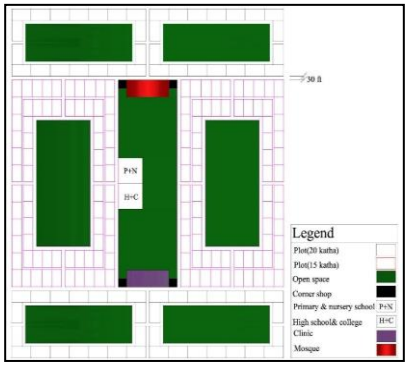
Figure 3: Different proposed zones of the study area

Neighborhood and Housing Block Design

Each of the neighborhoods will be designed for 10,000 people with density of 350 persons per acre. Two distinct neighborhood designs with different plot size and adequate community facilities are displayed in Figure 4 and Figure 5 consecutively. The required community facilities are calculated as per private residential land development act, 2004 of Bangladesh. The educational institutions (primary school, secondary school and college) are proposed to be grouped in a suitable location within each neighborhood so far as possible to increase the accessibility. Health care facilities as small scale community clinics, community centers, prayer hall, playground and open spaces are proposed in each of the neighborhood. A central large scale medical college and hospital of 48.62 acre is proposed in the CBD for the whole study area.

Apartment blocks are provided in "Block B" and "Block D" and are designed for low-income groups who will get less than 5 *katha* land after land readjustment project. Apartment buildings will be of 6 stories with 2 flats on each floor and the apartment size will vary with the size of the plot in different zones. Floor area ratio (FAR) will be 60 percent.





Source: Researcher's proposal, 2013

Figure 4: Neighborhood design for Block A. Figure 5: Neighborhood design for Block C.

Project Implementation and Management Proposals

Development Phases

For proper cost management, the total project is proposed to be completed in 3 consecutive phases.

Phase I (Block B and D): Proposed Implementation Period is 2013-2017.The project will be started with construction of apartments for land owner with initial land less than 5 *katha*. Government will recover the construction cost of apartments by selling a portion of constructed apartments after completion of this stage.

Phase II (CBD and Industrial Park): Proposed Implementation Period is 2018-2022. After completing phase I, the CBD and Industrial Park will be developed in this phase.

Phase III (Block A and C): Proposed Implementation Period is 2023-2027. After completing phase I and II, plots of all sizes will be redistributed among users in this phase. Existing unstable buildings will be demolished and the people residing there will be relocated to the apartments constructed in Phase I. The development cost of Block "A" and "C" will be carried out by selling lands developed in Phase II.

Project Management Policies

Efficient management measures both during the implementation and after the completion are necessary to ensure smooth operation of the project. One of the most important issues during project implementation is to carefully handling the stakeholders to confiscate biasness. Public participation should be ensured for proper management of the project. Strict regulatory measures should be incorporated in case of transfer of ownership of lands and apartments acquired after the completion of the project. Transfer of the house should be permissible back to the government only, at cost of construction adjusted for inflation. Government should run the project for 14 years as within this time, it is expected that the project will get self-sustained.

Co-operative society can be formed for efficient management of the project through active participation of the inhabitants of the area. The government or planning authority is expected to manage the project activities for thirty years. After this, residents will require to manage their own living area and assets. So, they need to gain the ability to manage their area on their own. The non-profit NGO's operating in the areas can guide the people comprehensively toward efficient management of the locality. Furthermore, the co-operative society can prove very proficient in governing the ecologically critical areas of the project also. Co-operative agriculture is proposed to manage and cultivate the agricultural lands and generate employment in the area. The idea was to form groups of four people to cultivate 20 *katha* of agricultural land together. Thus, 20 persons will make a group who will be responsible for cultivating each 100 *katha* agricultural land. For governing water bodies, 50 persons will make a group who will be responsible for Co-operative fishing in each 17.16 acres of wetlands. Thus total 1015 persons employed in fishing would manage the entire wetlands of the area by means of 20 groups. Open space, waste disposal, bazar etc. can also be managed efficiently through co-operative society.

The Proposed LR Project: An Analysis of Proficiency

After replotting the remaining land excluding 40 percent contribution will be returned to the original land owner in proportion to their original contribution by means of plot, apartment or monetary compensation. The size of the plots to be returned to the owner will be of 5,10,15,20 *kathas*. For small sized land (less than 5 *katha*), compensation will be made by apartment instead of plot. For land owners with plot of greater than 5 *katha*, the remaining amount after contribution will be returned in two ways. For example, within the returning amount of the portion, which is integral multiply of 5, is returned as plot. The remaining portion will be returned in monetary form. Plots assigned for commercial activity will be sold at comparatively high price than the market value to recover the project cost. But land for public facilities as college and small clinic will be subsidized comparing to the market value.

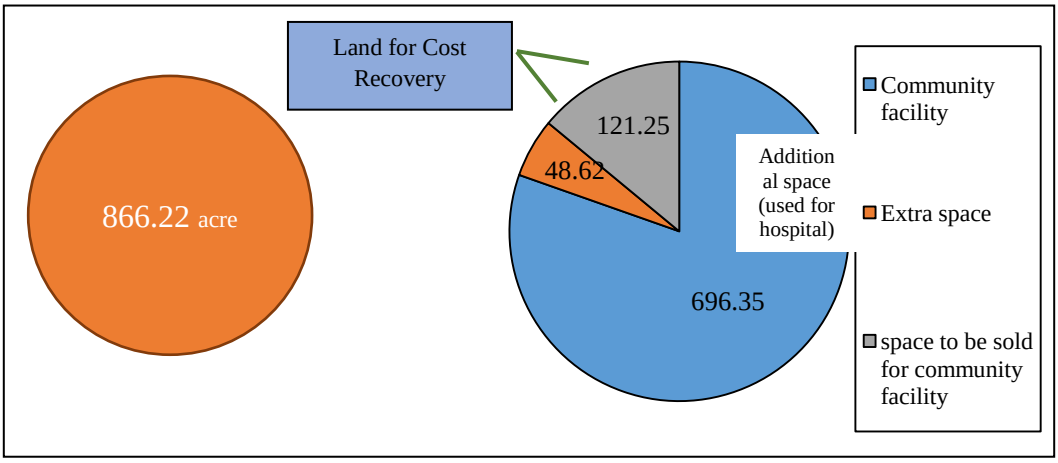
Returning floor space is calculated by deducting returning plot area from the total returning land area and then multiplied by 0.6. Here, 0.6 is for sixty percent FAR. In a word, it refers to the total floor space that the owner can construct apartment in the returned land. Floor space for flat construction cost recovery refers to the construction cost of the apartments that is recovered by selling a portion of the constructed apartment. Apartment construction cost and selling price are assumed 4000 and 10,000 BDT per

square feet consecutively depending on current practice in Dhaka city. Table 1 exhibits detailed results. The project cost will be recovered from the total contributed land from the project. Maximum social benefit was proposed in the distribution of contributed land as depicted in Figure 6. The extra space will be used for the proposed hospital.

Table 1: Calculation of contribution and gain with land readjustment

Plot Size (*katha*)	Total Number of plots	Total Plot Area (*katha*)	Contributed Land (*katha*)	Returning Land (*katha*)	Returning Plot (*katha*)	Returning Floor Space (sq. ft)	Flat Construction Cost Recovery (sq. ft)	Net Returning Floor Space (sq. ft)	Returning Money (Lakh BDT.)
0-5	5711	8626.47	3450.59	5175.88	0	2235981.02	894392.41	1341588.61	0
5-10	2102	15358.46	6143.39	9215.08	9215	33.87	0	0	2.03
10-15	1353	16468.84	6587.54	9881.30	9880	563.33	0	0	33.80
15-20	835	14659.95	5863.98	8795.97	8795	419.04	0	0	25.14
20-25	558	12443.22	4977.29	7465.93	7465	402.62	0	0	24.16
25-50	1043	35983.82	14393.53	21590.29	21590	126.14	0	0	7.57
50-100	337	22717.23	9086.89	13630.34	9085	1963586.02	0	0	117815.16
>100	31	3675.03	1470.01	2205.02	2205	7.78	0	0	0.47
Total			51973.21						

Source: Detailed Area Plan for DMDP area, 2010-15



Source: Researcher's proposal, 2013

Figure 6: Proposed distribution of contributed land

Project Cost and Benefit Estimation

Per *katha* development cost is assumed as 1,30,000 Taka on the basis of "Purbachal Housing Project" including 2.5 percent contingency cost. For revenue assortment, 121.25 acres of land will be sold to the private sector for community facility development. A

total of 817.60 acres land is required for adequate community facility of the study area as per set standards. The government will develop remaining 696.35 acres of community facility. Among 121.25 acres of land, 90.93 acres of land (for small clinic and college) will be sold to private sector at a subsidized rate of 40 lakh Taka per *katha*. Remaining 30.32 acres will be sold at a high price (60, 00000 Taka per *katha*) for commercial and retail activity to the private sector. The project cost and benefit estimation is shown in Table 2 and Table 3 respectively.

Table 2: Project cost estimation

Sector	Per unit cost	Total area (acre)	Total Cost (BDT. crore)
Development cost	205000 Taka/*katha*	2165.55	1689.129
Hospital and Medical college	4000 Taka/sq.ft	48.62	1512.2765
Total			3201.41

Table 3: Project revenue estimation

Sector	Per unit price	Total area (acre)	Total Revenue (Crore Taka)
Small clinic and College	20,00000 Taka/*katha*	90.93	2182.32
Commercial and Retail shop	2,10,00000 Taka/*katha*	30.32	1091.52
Total			3273.84

Source: Field survey, 2013

The benefits from the project is around seventy two and a half crore Taka from the project that is only 2 percent of the initial investment. The individual landowners may gain more from the project both economically and socially. Taking initial land price (before LR) in the study area as 30 lakh Taka per *katha* and land price after completion of the project 80 lakh Taka per *katha* and floor space 10,000 Taka per square feet, it has been revealed that landowner initially with small parcels of land (less than 5 *kathas*) is benefitted around 86.62 percent from the project.

Though the monetary value of benefit increases proportionally for the owners with larger plots, the marginal people of the project area were the utmost beneficiaries comparatively from the project both socially and economically. Moreover, no people are evicted from their own living place. Each and every landowner got at least an apartment for living in their respective landholdings. Government's benefit from the project is at a minimum level securing maximum social benefit.

Conclusion and Recommendation

It is normal that economic growth leads to rising employment and consequent income but this has led to an even faster rise in land prices leaving it unaffordable for the majority of population. The concept of affordable housing seems to be a simple solution in the current context of housing problem, but its execution remains complicated due to the imprecise policy framework. To make a favorable framework for affordable housing, it would require willpower from all the stakeholders by slightly altering their interests towards a wider social cause.

However, the result reveals that Land Readjustment (LR) technique can be a suitable instrument for the coordinated implementation of land assembly management as well as

water body preservation in the suburban areas of Dhaka city. The government can utilize the revenue earned from LR project in preservation and improvement of ecologically critical expanses in the study area and utilize the wetlands for flood management and coordinated water transportation. LR technique can be used efficiently to provide adequate and well-equipped accommodation for the city dwellers along with restricting illegal encroachment of agricultural and wetlands in the face of growing housing demand of the city. Social benefits can be achieved by offering incentives for the spaces for public facilities that is accessible for all. Thus LR can be proved as an efficient mode of reducing social inequality and a measure of social and economic benefit accomplishment by developing the location as a place of symbolic identification for the residents providing a sense of place, belonging, pride and satisfaction.

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