
Research Paper

Assessing Satisfaction Level of Urban Residential Area: A Comparative Study Based on Resident's Perception in Rajshahi City, Bangladesh

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Abstract

Rapid urban growth is taking place all over the world, and if the current trends of growth continue, more than 50% of the population of Bangladesh will live in urban areas by the year 2030. For ensuring sustainable and planned urban growth in city areas, residential area (RA) development projects play an important part. A well designed RA is a grouping of both varied and compatible land uses, such as housing, recreation and commercial centres all within one place. For ensuring the orderly development of Rajshahi City, Rajshahi Development Authority implemented residential projects like Padma, Parizat, Chayanir, Chandrima and Mohananda Residential Area. The aim of this study to find out the satisfaction level (SL) of different RA based on the resident's perception of living in those areas. The SL was estimated on the basis of physical environment (air & water quality, noise pollution, temperature in winter and summer, road condition, transport availability), neighbourhood environment (water, electricity & gas supply, drainage & sewerage system, solid waste management, educational, commercial, medical & recreational facilities and local security) and social environment (privacy, religious conflict, community activities and mastan & prostitute problem). The data collected from primary and secondary sources. Total of 250 samples was collected with 95 % confidence level and 5% confidence interval. The result suggests that Padma RA is comparatively better than other RA. The entrance road is narrow in Padma, Chayanir and Chandrima RA. Sewerage and drainage system alone with gas connectivity are the other common problems. The study helps urban planners to identify useful facilities which make the RA more user satisfactory.

Keywords

Urban growth, Residential area, Satisfaction Level, Rajshahi.

1. Introduction

Globally, more than 50% of the population lives in urban metropolitan areas (McGee, 1971, Habitat, 2016). The metropolitan population worldwide will grow to 6 billion by 2045. Cities produce more than 80% of global GDP, and if urbanisation can be managed inclusively, it will increase worldwide productivity and allowing innovation and new ideas to emerge (Rana,

2011, Habitat, 2016, Rahman, 2019). To manage orderly urban growth, effective land-use planning (LUP) initiative need to be taken (Kötter, 2019, Yadav, 2006). The process of LUP consists of two main functions, one is development plan (DP), and another one is development Control (DC) (Grimmond, 2007, Kötter, 2019, Weeraratne, 2016, Clayton Anthony and Radcliffe Nicholas, 1996, Werkman, 1996). DP refers to the strategic measurable goals that a city authority plans to meet and helps to cope with the changing situation in urban area due to rapid and unplanned urbanisation (Kaiser et al., 1995, Godschalk, 2004). DC restrict physical development planning in specific zones of the city to ensure orderly development of urban settlements for sustainable urban development (Xiang and Clarke, 2003, Werkman, 1996, Godschalk, 2004). One of the critical approaches in the DP is to take a significant number of planned residential area projects (Kaiser et al., 1995, Jones, 2013, Kötter, 2019). The successful implementation of these residential projects helps to reduce residential problems of the city and ensure orderly growth of the city.

Bangladesh is facing rapid urbanisation through rapid population growth since independence in 1971. More than 25% of people of Bangladesh currently lives in urban areas, and the current trend will lead more than 50% of population in urban areas by 2030. To reduce the haphazard and unplanned growth and ensure sustainable development of Rajshahi city, Rajshahi Development Authority (RDA) has already implemented several residential projects like Padma, Chandrima, Chayanir, Mohananda and Parizat Residential Area. For ensuring sustainable environment and make the development of Rajshahi city more inclusive, better quality of residential environment needs to be maintained. Utility services like drinking water supply, sanitation, sewerage, waste disposal, drainage, electricity, and gas connection for cooking are essential physical infrastructure for maintaining environmental quality. Also, a well-designed residential area is a grouping of both varied and compatible land uses, such as housing, recreation and commercial centres all within one place. However, the tremendous population pressure and lack of proper management sometimes create difficulties for the people leaving in residential areas.

Several studies discuss the satisfaction level of people based on various urban facilities and the overall quality of the environment. Ali et al., (2014) determine the satisfaction level of people and environment based on urban conveniences and environmental quality Bandarban municipality area (Ali et al., 2014). In another study Majumder et al. (2007) produce environmental quality maps of 41 wards of to show the spatial pattern of urban environmental quality for Chittagong Metropolitan City (Majumder et al., 2007). Both of this study use public opinion to determine the satisfaction level of people. No investigation was conducted to determine the satisfaction level of urban residential areas of Rajshahi City. Previous studies mainly related with the topic of urban form, urban environment and socio-economic condition of the slum dwellers (Kashem et al., 2009, Jamil and Panday, 2012, Rahman et al., 2010, Kafy et al., 2018a). Thus, the present study will help to provide a significant output to the city authority for successful development of residential projects in Rajshahi City.

The study aims to identify the satisfaction level of different residential area (Padma, Parizat, Chayanir, Chandrima and Mohananda) of Rajshahi city based on resident's perception living in those areas. The level of satisfaction determines based on physical, neighbourhood and social environment present in each residential area. This study also provides some useful recommendations to make the residential acres more living and environmental friendly as well as sustainable in the near future.

2. Materials and Methods

2.1. Study area profile

Rajshahi City is the divisional headquarter of Rajshahi division as well as the administrative district and is one of the four metropolitan cities of Bangladesh. Often referred to as Silk City and Education City, Rajshahi is located on the bank of the Padma River in the western boundary of the country. The City Corporation consists of 30 wards and has an area of 48 Km². Currently, it has an estimated population of around 449,657 people and growing at a rate of 1.25% annually (Clemett et al., 2006, Kafy et al., 2018b). For ensuring the orderly development of Rajshahi City, Rajshahi Development Authority implemented residential projects like Padma, Parizat, Chayanir, Chandrima and Mohananda Residential Area (Figure 1).

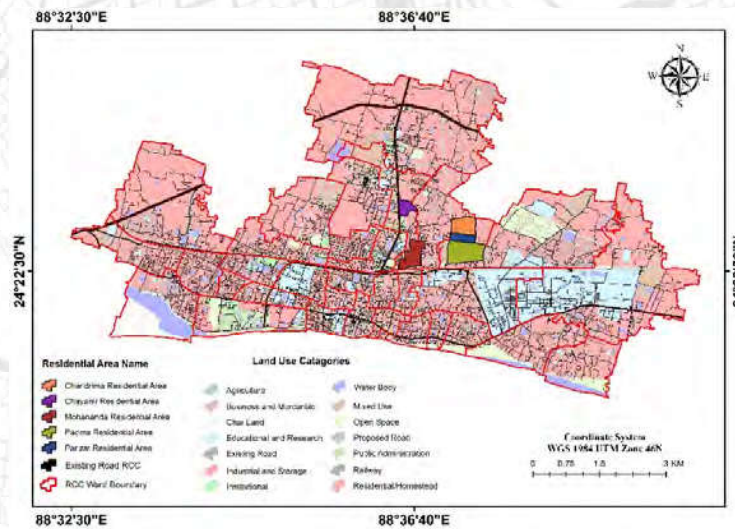


Figure 1 Land use of Rajshahi City Corporation and location of the residential areas

2.2. Data Collection and processing

In the current study, primary data were collected at the household level from the different residential area for the resident's perception of urban residential quality considering 47 environmental variables. For the primary sources of information, 474 households were surveyed with the help of a structural questionnaire prepared based on three environmental variables in the different residential area.

Table 1 Population and collected a sample from the different residential area

Residential area	Number of Plots	Population	Confidence level	Confidence Interval	sample collected
Padma Residential	565	28250			96
Parizat Residential	56	2800			93
Chayanir Residential	224	11200			95
Chandrima Residential	400	20000	95	10	96
Mohananda Residential	97	4850			94
Total	1342	67100			474

The larger the sample size, the more accurate the answers which genuinely reflect the population. Sample size estimation was performed using the sample size calculator

(<https://www.surveysystem.com/sscalc.htm>). This Sample size calculator determines how many people need to interview to get the best results that reflect the target population. The samples were selected at 95% confidence level and 10% confidence interval by taking random samples from 67100 populations in five different residential areas (Table 1). The collected data were processed and analysed with the help of required computer software such as Microsoft Excel and Statistical Package for Social Science (SPSS) and. The statistical data was presented in the tabular and graphical form to make it easy and understandable.

2.3. Estimation of Index of Satisfaction

The level of satisfaction and dissatisfaction of the different residential area based on environmental variables was estimated using the following satisfaction index developed by Hall, Yen and Tan (1975)

$$I_s = \frac{F_s - F_D}{N}(1)$$

I_s = Satisfaction Index.

F_s = Number of Satisfied Respondents.

F_D = Number of Dissatisfied Respondents.

N = Total Number of Respondents.

In the Satisfaction Index (SI) $I_s = +1$ represents the highest level of satisfaction and $I_s = -1$, meaning the highest level of dissatisfaction. The above SI was used by Hossain, 1995, Hasan, 1999, Rahman, 2010, Majumder, 2007, and Ali, 2014 to determine the respondent SI of various income groups and urban environmental quality (Majumder et al., 2007, Ali et al., 2014, Hossain, 1995, Hasan, 1999, Aown and Meer, 2018, Rahman et al., 2010).

3. Result and discussion

3.1. Socioeconomic and demographic characteristics of the respondent

Generally, characteristics such as age, gender, education level, income, marital status and employment type etc. are being considered as socio-demographic characteristics and was asked in all kinds of surveys. Socio-demographics not only represents the actual scenario but also demonstrate the environmental status of an area. The percentage of the male respondent (52%) is slightly higher than the female respondent (48%) and where 58% people are married, and 42% of the respondents are unmarried. Age group was divided into three categories between 15-65 years, older than 65 years and others. A higher percentage (69%) of the respondents are between 15-65 years. Among all the respondents, 65% of them are engaged in earning activity, whereas 35% of them are either unemployed, housewife or retired. Respondent socio-economic ability and purchasing capability were reflected with the status of income. Income level of the respondents is one of the leading indicators to define the capabilities of receiving each facility provided by urban areas. Higher class and middle-class people were lived in residential area but some lower-income group people (guards, construction worker etc.) also live in those areas. Almost 18% people individual income is 26K-30K and maximum family income (22.2%) is more than 50K. In this study, authors categorised the family income of the respondent into three groups. Income less than 20K is lower-income group. Income within 21K-50K is middle-income group and income more than 50K is high-income group. From the household survey, this study identified that maximum people were involved with service (39%) and local business (23%) activities. Only a few

respondents (2% and 4%) were engaged with worker and other service activity. From the respondent, 16% respondents are housewife and student.

3.2. Residential area wise Monthly individual and family income

Residents of the selected residential area were mainly higher and middle-income group. Figure-2 and 3 represent the monthly individual and family income of the different residential area in Rajshahi City. The individual income of 9% respondent in Mohananda residential area is less than 10K, followed by Mohananda residential area (8%). The highest percentage of individual income(≥50K) respondent was found in Parizat residential area (12%) followed by 10% in Mohananda residential area. From all the residential area 23% respondent individual income(26K-30K) was found Chayanir residential area followed by 20% in Parizat residential area, 17% in Chandrima residential area and 16% in Padma residential area.

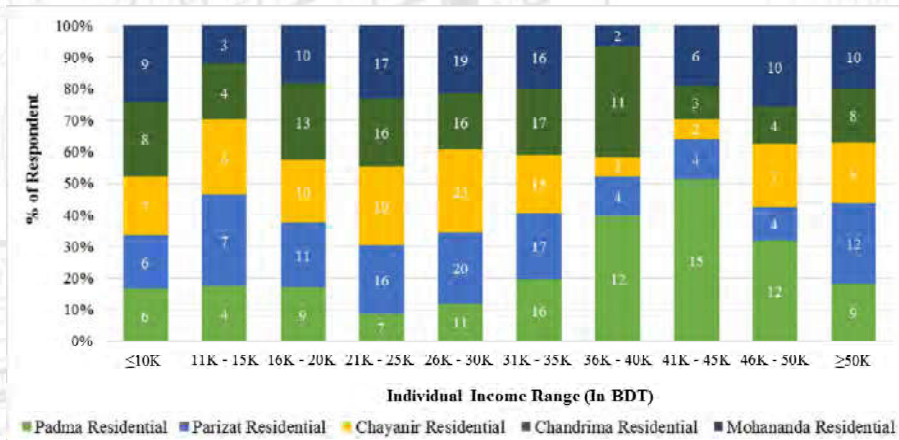


Figure 2 Individual income of respondent in the different residential area

The family income of 5% respondent in Padma residential area is less than 20K, followed by Parizat residential area (4%). The highest percentage of family income (≥50K) respondent was found in Padma residential area (29%) followed by 27% in Mohananda residential area. From all the residential area 29% respondent family income(≥50K) was found Padma residential area followed by 20%(41K-50K) in Parizat and Chayanir residential area respectively.

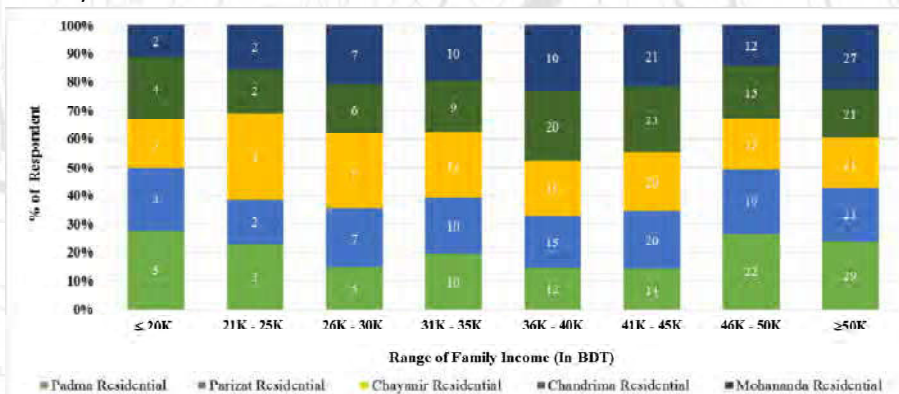


Figure 3 Family income of respondent in the different residential area

3.3. Work status of the respondent in the various residential area

Figure 4 illustrates the residential area wise working statuses of the respondent. The maximum number of respondent working as a service holder (45%) lives in Chayanim residential area followed by 40% in Chandrima residential area, 35% in Mohananda residential area and 30% in Padma and Parizat residential area respectively. 25% respondent in Padma and Chayanim residential area engaged with local business activities followed by the maximum student (25%) lives in Parizat residential area. The lowest percentage of working groups were found in different residential areas were 5% of homemaker in Chandrima residential area and 5% of worker in Chayanim and Padma residential area.

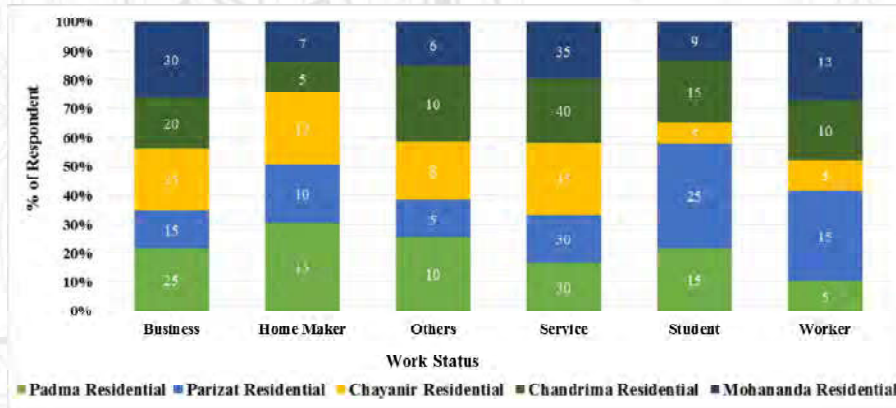


Figure 4 Work status of the respondent in the different residential area

3.4. Estimating Satisfaction level of the various residential area

3.4.1 Satisfaction level of Physical Environment

In Physical environment, 17 variables were considered for residential satisfaction level (Table 2). The only temperature in summer consists of negative value (-0.05) of SI in all the residential areas. Unbalanced topographic condition, a massive number of heat island, geographical location is the main reason behind this extreme heat in those areas. Noise outside (0.20) holds the second position according to the ranking of satisfaction index. The ongoing construction work creates noise around those residential areas and is now a dissatisfactory issue for all the residents. Waterlogging and water quality placed third (0.25) and fourth (0.29) position respectively in satisfaction index. Water quality is poor in all the residential areas as the water contains too much iron and unhealthy particles with it.

Table 2 Ranking of the physical environmental variables

Physical Environment Variables	Satisfaction Index (S.I)	Ranking of Satisfaction
Noise inside (Human noise, radio, TV)	1.00	17
Airflow	0.96	16
Quality of air (smell)	0.96	15
Tree within the area	0.96	14
Presence of water bodies	0.96	13
Number of garden/parks/open spaces.	0.93	12
Traffic jam	0.89	11
Temperature (winter)	0.85	10
Earthquake	0.85	9
Transport availability	0.71	8
Quality of air (dust particles/SPM)	0.67	7

Transport service system	0.67	6
Street condition (with, construction)	0.62	5
Water quality	0.29	4
Water logging	0.25	3
Noise outside (traffic/loud speaker etc)	0.20	2
Temperature summer	-0.05	1

Though WASA supplies it, the water quality remains all the same. Street condition, transport service system, transport availability, quality of air had a moderate positive value in satisfaction index. Whereas poorly constructed roads in Chayanir, Mahananda and Chandrima Residential Area is a concern for the residents as the roads were not properly designed. Also, no public transport was available in most of the areas. Residents have to cover a significant amount of distance to get transport service (auto-rickshaw and easy bikes). Noise inside, airflow, quality of air, tree within the area, presence of water bodies, number of garden/parks/open spaces, traffic jam have higher positive values in the SI. Greeneries can be seen all around the residential areas like trees, nurseries and vast open fields. There was a little number of ponds and small lakes, but the numbers are satisfactory according to the residents there. Noise inside has the highest value (1.00) and the highest rank (17) in the satisfaction index.

3.4.2 Satisfaction level of Neighbourhood Environment

In the neighbourhood environment, 22 variables were considered for residential satisfaction level (Table 3). The neighbourhood environment demonstrates a perfect scenario for all the residential area and no variable show negative value in satisfaction index. Drainage system holds the lowest rank having the lowermost positive value (0.51) in satisfaction index. Lack of drainage connectivity and narrow width of the drain affect the drainage system and create water logging problem in the city. Utility services like water supply, gas supply, electricity supply, sewerage system consist moderate value (0.56) in satisfaction index.

Table 3 Ranking of the Neighbourhood environmental variables

Neighbourhood Environment Variables	Satisfaction Index (S.I)	Ranking of Satisfaction
Educational facilities	0.96	22
Business facilities	0.93	21
Sanitation	0.91	20
Housing condition (Rant, Quality)	0.89	19
Religious places (Mosque/Temple)	0.89	18
Health care & Medical services	0.85	17
Graveyards	0.85	16
Banking facilities	0.85	15
Solid waste Management (Garbage)	0.75	14
Cyber cafe (Internet & e-mail)	0.75	13
Telephone services	0.71	12
Shopping centre	0.71	11
Recreational facilities	0.60	10
Parking facilities	0.60	9
Employment facilities	0.60	8
Local security, law & order	0.60	7
Water supply	0.56	6

Health care & medical services, graveyards, banking facilities have demonstrated highest SI(0.85) compare with solid waste management (garbage), cyber cafe (internet & e-mail), telephone services, shopping centre, recreational facilities, parking facilities, employment

facilities, local security, law & order which SI varies from (0.75-0.60). The presence of Barind medical college and hospital near Chandrima, Padma and Mohananda residential area make the healthcare facility excellent in those areas. Parking facility is excellent, and on-street parking was strictly prohibited in those residential areas. Educational facilities consist the highest positive value (0.96), and that's why received highest satisfaction rank from all the neighbourhood environment variables.

3.4.3 Satisfaction level of Social Environment

Connectivity between different people and the presence of community feeling within the neighbours was excellent in various residential areas (Table 4). Mastan problem shows the lowest value of satisfaction (0.60) and ranked lowest in the satisfaction ranking. Mastan problem mainly happened in Padma, Chandrima and Mohananda residential area. Also hijacking and eve-teasing were noticeable in smaller number. Expect these issue; other variables have highest positive value (1.00). No religious conflict was seen in those residential areas. According to the satisfaction index, the highest value of satisfaction is +1, and the lowest value is -1. With respect to the satisfaction index, the respondent opinion on physical, neighbourhood and social environmental variables are much satisfied (for physical environment this value is 0.343, neighbourhood environment 0.420 and social environment 0.789) as shown in Table 5.

Table 4 Ranking of the social-environmental variables

Neighbourhood Social Variables	Satisfaction Index (S.I)	Ranking of Satisfaction
Community feeling.	1.00	8
Connectivity of people	1.00	7
Privacy	1.00	6
Community activities	1.00	5
Prostitute problem	1.00	4
Religious conflict	1.00	3
Nude poster problem	0.98	2
Mastan problem	0.60	1

Table 5 Overall Satisfaction Index and ranking of Environmental variables

Variables	Number of Respondents				Satisfaction Index	Ranking
	Satisfied	Acceptable	Dissatisfied	Total		
Physical	2495	1310	885	4690	0.343	1
Neighbourhood	3415	1780	865	6060	0.420	2
Social	1805	345	60	2210	0.789	3

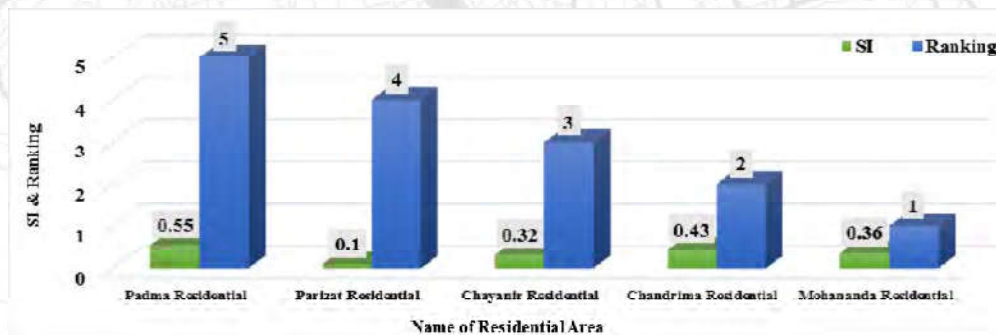
3.4.6 Satisfaction level of different residential areas

Table 6 and Figure 5 represent the satisfied, dissatisfied respondent and raking of the residential areas based on the SI estimated from different environmental variables. The highest number of the satisfied respondent was found in Padma residential area, where 65% of respondents are satisfied, and 10% respondents are dissatisfied.

Table 6 SI and ranking of different residential areas based on physical, neighbourhood and social environment

Residential Area	Number of Respondent in percentage (%)		
	Satisfied Respondents (%)	Acceptable respondents (%)	Dissatisfied Respondents (%)
Padma Residential	65	25	10
Parizat Residential	45	20	35
Chayanir Residential	53	26	21
Chandrima Residential	62	19	19
Mohananda Residential	57	22	21

In the second-highest place occupied by Chandrima residential area where 62% respondents are satisfied, and 19% respondents are dissatisfied. Based on the satisfied respondent. Third, fourth and fifth place was occupied by Mohananda (satisfied respondents 57% and dissatisfied Respondent 21 %), Chayanir (satisfied respondents 53% and dissatisfied Respondent 21 %) and Parizat (satisfied respondents 45% and dissatisfied Respondent 35 %) residential area respectively. Based on people perceptions collected from all the residential area, Padma Residential received the highest rank (5) because of excellent physical, neighbourhood and social environment. Padma residential area was the oldest residential area in Rajshahi city, and it's well equipped with all the necessary utility facilities. As the highest value of ranking indicates higher satisfaction, the lower ranking was estimated for Mohananda residential area (1) based on people perceptions. Mohananda, along with Chandrima (2) and Chayanir (3) residential area was estimated lower rank because these areas were newly constructed and deprived of some essential utility facilities (Figure 5).

**Figure 5 Ranking of different residential area based on the satisfaction index**

4. Conclusion

Rapid urbanisation creates difficulties for the urban areas and generates pressure on essential utility services and environment. A sustainable urban residential environment depends on the quality of infrastructure and proper management environmental variables. According to the people perception collected from different residential area of Rajshahi City Corporation, maximum people were satisfied with their surrounding environment. If the city authority looks after few problems in the residential areas, these areas will help to maintain sustainable and inclusive urbanization in future. Improve in the drainage and sewerage system will reduce the water loggings of residential areas in heavy rainy days. Gas

connectivity will enrich the quality of utility facilities in those areas. More security needs to ensure fullycrime-free residential areas. Appropriate governmental planning and initiatives, political commitments and collaboration with NGOs will help to reduce the urban residential areas problems and create inclusive ways for making the cities more environmentally friendly.

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