Journal of Mechanical, Civil and Industrial Engineering
ISSN: 2710-1436
DOI: 10.32996/jmcie
Journal Homepage: www.al-kindipublisher.com/index.php/jmcie

JMCIE
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Land Use and Environmental Planning in Rawalpindi, Pakistan

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| ABSTRACT
Over the last two decades, Pakistan has made considerable progress in reducing absolute poverty and improving shared prosperity, but most of the population remains poor or vulnerable. A key dimension of social vulnerability in South Asia is exposure to hydrological and meteorological hazards including storms, floods, and droughts. In this review, a questionnaire from the inhabitants to assess the adequacy of existing urban plans regarding reasonable improvement in Rawalpindi has been organized. In addition, by gathering the important secondary information from the concerned divisions, the planning specialists from Rawalpindi Development Authority (RDA), Capital Development Authority (CDA), Tehsil Municipal Administration (TMA) Rawalpindi and the engineers of the plans were likewise met and their opinions discussed. Furthermore, utilizing SPSS (Statistical Package for Social Sciences) to break down the essential information and to draw deductions. Similarly, the urban sustainability index, a set of indicators based on environmental, social and economic parameters was selected for development. As the result, planning issues and problems in Rawalpindi were analyzed in five separate subjects: (1) Land use planning and policy, laws and regulations, (2) Urbanization and transport system, (3) Landuse Change and Its Impact on Watershed Hydrology, (4) Site planning techniques and (5) Social and environmental impact assessment. The mitigation measures and recommendations were suggested accordingly.

| KEYWORDS

Land use planning; Urbanization, Transportation system; Watershed; environmental impact assessment

| ARTICLE INFORMATION

ACCEPTED: 01 April 2023 **PUBLISHED:** 04 April 2023 **DOI:** 10.32996/jmcie.2023.4.2.1

1. Introduction

Urbanization may be regarded as an ancient art, but it has become a public institution in Pakistan today to advise and organize differentiated decisions that impact a city's livability. Planning is a continuous process in which urban planning activities of individuals and organizations are controlled and directed in order to facilitate the health, prosperity and welfare of all members of the city. Town planning dealt with maintaining an organized and effective pattern of land use and adequate provision of housing, transportation, infrastructure and services. The preparation of urban planning grew from an exercise in decorating a city to a phase in which its construction was controlled (Qadeer, 1996). Town planning tradition existed in Pakistan before the colonialists arrived on the subcontinent. The towns of Mughal had a purely designed structure. The urban planning process in major towns started with the establishment of Development Trusts to coordinate development schemes and devise improvement plans. However, in the context of colonialism's legacy, it is necessary to understand urban planning in Pakistan today. When the British arrived, they started changing the existing towns. They typically built a military cantonment and an area of civilian lines for administration, and they gradually developed indigenous suburbs, too. Nevertheless, this practice was an urban planning exercise and was not explicitly brought under the heading of "town planning" (The Urban Unit, 2007).

Rawalpindi is an administrative town named after Pakistan's "Interim Capital." Due to the decided momentum of growth, it obtained its present dense shape during 1968-1996. Despite being a military headquarters, the city has a very good economic base. Pakistan's urban problems, especially in Rawalpindi, are rising day by day, and housing shortages are also compounded

simultaneously with time. Around 25 per cent of this city's urban population lives in squatter settlements. Squatter and slum development, traffic delays and congestion, and adverse climate are typical urban geographies. Likewise, there is the contamination of air and water, and waste of energy. Development plans and programs are being developed and implemented in Pakistan and urban planning continues to be institutionalized but they do not appear to achieve sustainable urban development (Qasim & Zaidi, 2013).

Rawalpindi's first Master Plan was developed for a 20-year duration in 1968-69. Nevertheless, unplanned development of the city and houses has sprung up all over because of not being incorporated in its true nature. The main reasons for the useless and ineffective implementation are as follows. First, because of the relocation of the Federal Capital from Karachi to Islamabad / Rawalpindi and the increased demand for housing and office accommodation. Second, the Municipal Corporation (the implementing agency) administrators didn't care at all about going through the plan's proposals. Thus, transit agreements were concluded by overseeing the proposals for the plan. In view of the rapid growth of the city, the Directorate of Metropolitan Planning and Rawalpindi Development Authority (RDA) expressed a Guided Development Plan in the 1990s. The main objective of this initiative was to ensure the best way to build roads in the development of Rawalpindi. The RDA has succeeded to some degree in certifying the same for some roads proposed in the Guided Development Plan. However, the proposal could not be accepted by the Authority. The new planning method was implemented in the Rawalpindi Master Plan format (1996-2016). The Rawalpindi Master Plan is stated to provide specific guidelines for the systematic and planned growth of the town. The Rawalpindi district office for urban development, housing and community planning drafted this proposal in 1991 (Sultana, 2010). In order to provide a comprehensive structure for urban growth and expansion, Rawalpindi Master Plan (1996-2016) was developed. The sound characteristics of the plan are described below for land development and management (The Urban Unit, 2007).

2. Description of the study area

Rawalpindi is located in the northernmost part of the Punjab province of Pakistan and covers an area of 5,286 km^2 (Figure 1). The latitude of Rawalpindi, Pakistan is 33.626057, and the longitude is 73.071442. It is the fourth largest city in Pakistan after Karachi, Lahore and Faisalabad, and the third largest in Punjab after Lahore and Faisalabad. Rawalpindi is next to Pakistan's capital Islamabad, and the two are jointly known as the "twin cities" because of the social and economic links between them.

Rawalpindi features a humid subtropical climate with hot and wet summers and cooler and drier winters. Rawalpindi and its twin city Islamabad, during the year, experience an average of 91 thunderstorms, which is the highest frequency of any plain elevation city in the country. Strong windstorms are frequent in the summer during which wind gusts have been reported by Pakistan Meteorological Department to have reached 176 km/h. Such thunder/wind storms, resulting in some damage to infrastructure. The weather is highly variable due to the proximity of the city to the foothills of Himalayas. The average annual rainfall is 1,254.8 mm, most of which falls in the summer monsoon season. However, westerly disturbances also bring quite significant rainfall in the winter.

Figure 1. Rawalpindi map

3. Methodology

Qasim & Zaidi, (2013) inspected the above circumstance through the contextual analysis of master planning in Rawalpindi, Pakistan and its usage through housing schemes. He studied 5% of human settlements for example housing schemes, Katchi abadies and ghettos through organized questionnaires from the inhabitants to assess the adequacy of existing urban plans regarding reasonable improvement in Rawalpindi. The important secondary information from the concerned divisions had been gathered. The planning specialists from RDA, CDA (Capital Development Authority), TMA (Tehsil Municipal Administration) Rawalpindi and the engineers of the plans were likewise met and their sentiments were noted down by them. Other than these perceptions at the site were likewise made. They utilized SPSS (Statistical Package for Social Sciences) to break down the essential information and to draw deductions. Similarly, a study was done by Ghalib et al., (2017) to develop the urban sustainability index, a set of indicators based on environmental, social and economic parameters were selected. They carried out the process of calculating the index by following the various steps which are shown in figure 2. In addition, the following methods have been developed and used for "Urbanization, Gender and Violence in Rawalpindi and Islamabad" by Sawas et al., (2013).

- Secondary research gave by the government, the scholarly world, research foundations and NGOs.
- Primary research including: a multi month media investigation of the chosen print and online papers, TV and radio which are pertinent to national and nearby talks about savagery in Pakistan (and Karachi and Islamabad/Rawalpindi).
- Two workshops fusing the entire examination group, one in June 2013 and one in December 2013, where the checking study was planned, talked about and combined.

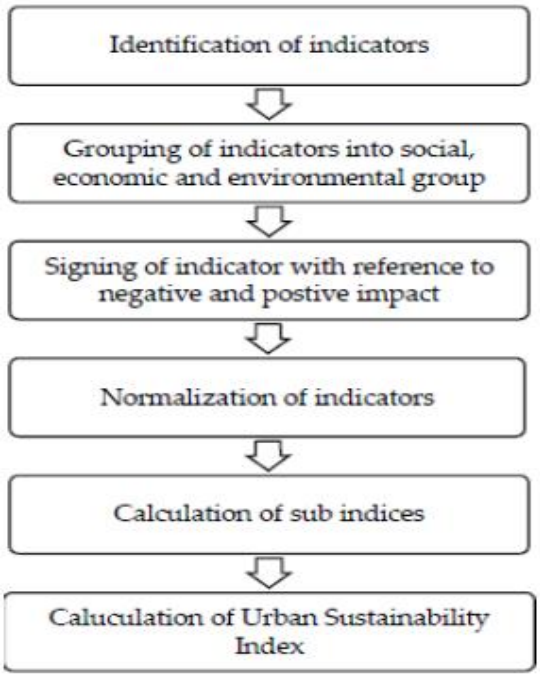

Figure 2. The procedure of calculating the urban sustainability index

Adeel et al., (2016) performed a study identified with public transport network and the administration of public transport tasks for "Towards an Inclusive Public Transport System in Pakistan" in light of the essential and optional information. They gathered essential information on public transport route networks through GPS based field surveys in December 2013. Likewise, they overlaid the field information on the online road map uninhibitedly accessible through ESRI's ArcGIS for GIS based cushion investigation. As there was no updated public transport network map of the investigation zone, the information and its outcomes give a wealth of data on public transport openness in the study zone. In addition, Ali, (2015) conducted the "Mid Term Review Pakistan Sustainable Transport Project" and obtained all subjective and quantitative information through work area surveys and gatherings with partners and organized for analyses. He finalized his study as per following tools:

- Documentation reviews: A review of the PAKSTRAN Project Document, Annual Progress Reports, Quarterly Progress Reports and Annual Work Plan for 2015.
- Meetings with partners: The Reviewer met with the key partners of PAKSTRAN containing UNDP, the Ministry of Water and Power, the Project Management Unit of PAKSTRAN, CIU Sindh, CIU Punjab, Pakistan Environmental Protection

Agency, The Urban Unit, National Transport Research Center, NED University Karachi, UET Lahore, Punjab Transport Department and IUCN.

Regarding land use change and its impact on Watershed Hydrology in Rawalpindi, different exploration and specialized reports and papers identified with flood management studies and published by various academic, research and counseling foundations. Aslam, (2018) extensively checked to infer and incorporate key discoveries on flood management in Pakistan. For example, Remote Sensing and SWAT Modeling Techniques were utilized for a situation in Rawal Watershed in Rawalpindi. So as to examine the transient changes in the watershed land use. Asharf et al., (2014) utilized LANDSAT-7 ETM+ (2010 period) (Path-Row: 150-37) and satellite image information of LANDSAT-5 TM (period 1992) with a spatial resolution of 30 m. They used the basic input data for SWAT 2005 model and digital elevation model (DEM), hydrology, soil and landuse appropriation extricated from image data. What's more, an examination was conducted by Shahid et al., (2020) in Rawalpindi. They utilized the Hydrologic Engineering Center Hydrological Modeling System (HEC-HMS) which is the precipitation spillover semi-conveyed hydrological model, that utilizes experimental procedures to convert the precipitation to overflow volume to survey the effect of land use and climate changes on the variety of runoff in Margalla Hills watersheds, Rawalpindi. The hydrographs delivered by HEC-HMS are utilized independently or in combination with different apparatuses to examine land use land cover, flood forecasting or urbanization impact on flood magnitude, flood damage control, and flood regulation.

4. Results and Recommendations

The implementation of the Master Plans for Rawalpindi represents an intricate image of accomplishment and disappointment. The plan neglects to suit the existing urban zone of Rawalpindi. Capital Development Authority performs the plan effectively in empty zones however neglects to execute the plan where complex circumstances emerge with Rawalpindi. Because of these uneven characteristics of assets, the urban region of Rawalpindi was developed with incapable land use planning and control. The absence of a legitimate institutional structure is making significant obstruction to drawing in further private interest in the housing sector for Rawalpindi Metropolitan territory. It is currently all around perceived everywhere throughout the world that planning is no greater obligation of the public sector alone. Presently planning must be effective through the contribution of the private division and local gatherings. In this way, the requirement for coordination of every one of these divisions at the metropolitan and even provincial scale has gotten basic. Likewise, the quick and often unplanned and uncoordinated development of urban communities has genuinely undermined existing transportation systems and considerably expanded the challenges of making future transportation systems in Pakistan's urban areas, particularly in Rawalpindi. It is in fact in Pakistan's urban areas that the best development in motor vehicles has been found in the previous scarcely any years and is normal later on, essentially in urban zones. The environmental and social impacts are noteworthy and legitimately identified with personal satisfaction and urban profitability. These effects incorporate energy consumption, congestion, air contamination, and car accidents. Hence, urban transportation issues are of preeminent significance to help the portability necessities in these developing urban areas and require new methodologies. Overall the accompanying suggestion and mitigation measures proposed to conquer the difficulties referenced previously:

4.1 Land use planning and policy, laws and regulations

The evaluation of land development and management practices in Rawalpindi of Punjab and the revision of best practice models in developed and developing nations lead the accompanying suggestions identifying with land development and management and planning system in Pakistan.

1. Need for Comprehensive Town Planning Act

There is a need to present a thorough town planning act that will give politicians, organizers, and executives a device to screen improvement efficiently at local and provincial levels. The thorough town planning act is to accommodate City and Regional Planning, the creation, association and forces of Planning establishments, the guideline of sub-division of land and the procurement of options to keep planned roads free from infringements, and giving punishments for violation of this act. It will renovate our societies where individuals might want to live, work and raise their families. It will likewise give new look to our transportation organisation, parks, public utilities and community buildings just as the need of the individuals for their housing. Other than its social effect, they would likewise observe the monetary advantages in their nation as it will permit developing industries at local and regional levels in an appropriate planning process (The Urban Unit, 2007).

2. Proposed Institutional Framework

In order to empower the national government to offer warning types of assistance, the provincial government to offer instrumental types of assistance and the local government to give supporting administrations to the ceaseless linkages in the planning procedure, they have to have a scattering of planning powers at all the managerial levels. Planning institutions at national, provincial, district and local levels are required to be authorized and engaged to execute town planning standards in their individual specialists (The Urban Unit, 2007).

3. Proposed Spatial Planning Framework

An extensive methodology should be embraced for land development and management in every human settlement, especially in five significant urban communities in Punjab (The Urban Unit, 2007).

(i) Enhancing rural-urban linkages to improve the respective functional efficiencies for growth and sustainable development.
(ii) Ensuring equitable and balanced development through the provision of infrastructure and services, with strengthened local governments under the devolved system in the lead role.
(iii) Developing public-private partnerships.

Space use and planning issues should be tended to with regard to both rural and urban regions. There have been a few issues identified with physical planning. Initially, urbanization issues are not being addressed completely as there is no spatial planning at the national and provincial levels. Second, the connection between spatial planning and devolved arrangements should be plainly settled to incorporate urban and provincial development. Third, a legal spread for plan provision and execution should be given. Fourth, the aimless change of rich agricultural land for urban uses should be checked. At last, haphazard development around enormous urban communities and along national highways is making genuine traffic and management issues (The Urban Unit, 2007).

4. Recommendation for Airport Land Use Planning

The following points should be considered in land use planning (Compatible airport land uses).

a. Limits on Intensity of Use and Building Density

The most serious danger of a flight related accident is during takeoff and landing within a couple of miles of an air terminal, especially in regions nearest to the ends of the runway and the runway centerline expanded. On the off chance that there are barely any structures around there, for example, houses that pilots can keep away from, the hazard to the two individuals on the ground and in the plane is decreased fundamentally. As mentioned earlier, in the Karachi airplane crash, 25 houses were affected, and at least 11 people from residents of the houses were wounded according to reports "Pakistan investigates PIA plane crash killed 97 Karachi" (Aljazeera, 2020). The essential method to constrain the danger of harm and individual injury from flight accidents that happen close to the airport is along these lines very basic breaking point populace and building density in the regions where aviation accidents are bound to happen, especially off the parts of the runways.

The most ordinarily utilized proportion of satisfactory development density in this setting is the number of persons per acre of land. A decent administrative methodology is to boycott certain high-density private uses and places of public gathering in airport methodology passages (i.e., Safety Zones A and B) that, by their very character, pull in or house huge hordes of people one after another (e.g., a games arena or church) or that surpass a predefined populace per acre density. Along these lines, for instance, private development with a density of one dwelling unit per acre of land would not be permitted in Zone B, while a development that was created at a lower density of one unit for every three acres of land might be adequate. Business and other nonresidential uses may be permitted just in the event that they don't surpass indicated densities for a specific sort of utilization (e.g., industrial uses that house less than 15 persons/acre) (National Academies of Sciences Engineering and Medicine, 2003).

b. Risk Reduction Through Building Design

Despite the fact that shirking serious uses is consistently best, an idea that might be adequate in certain circumstances is the chance to decrease exceptional structure design. This idea ought to be constrained to the airport which is arranged in profoundly urbanized areas and is utilized dominatingly by permitting higher numbers of individuals (close to 1.5 to 2.0 occasions the essential force) in buildings which join uncommon hazard decrease development highlights, such as, (Alternative et al., n.d.):

- Concrete walls
- Limited number and size of windows
- Upgraded roof strength
- No skylights
- Enhanced fire sprinkler system
- Single-story height
- Increased number of emergency exits

c. Residential Areas

Customarily, air terminals have been based on the edges of towns and urban communities or in rustic regions to evade commotion impacts on residential areas and to exploit generally cheap land. After some time, in any case, communities develop and new

houses and business and industrial developments creep into open spaces and ranches that were once given support around the air terminal. In fact, sometimes this development is prodded by the air terminal itself as hotels, warehouses, and different offices are worked to support air terminal clients. If not sited appropriately, this improvement can make dangers to public safety and to air terminal suitability. Private development close to air terminals represents the absolute most noteworthy dangers to human safety on various levels. The condition is very basic putting bigger quantities of individuals close to air airports on an everyday premise makes them all the more eventually powerless to airplane accidents as discussed in the population density area over. Besides, private developments can make different nuisances to airplane tasks. Interruptions like road lighting around evening time and private stormwater confinement lakes that could draw in waterfowl to the region present dangers to airplane safety. As recently referenced, flight PK-8303 from the eastern city of Lahore collided with the Model Colony neighborhood on way to deal with Karachi's main international airport. Unmistakably, the effective control of private site improvement close to airports can help lighten these dangers (Alternative et al., n.d.).

d. Open Areas- Safety Concern for Aircraft Occupants

The hazard to plane tenants in case of an emergency landing is a significant issue. Safety for individuals on the ground is another main thought in controlling development and population density around airports. In an emergency descent, pilots can regularly control the airplane partly and will search for a homestead field or other open space in the event that they can't arrive at the air airport runway. Particularly for small airplane, the chances of the airplane tenants avoiding serious or deadly injury in such circumstances are altogether influenced by the landscape and land use highlights at the landing site. An open zone doesn't need to be extremely huge to permit a fruitful emergency landing in which the pilot and travelers endure the accident with restricted wounds. As regards, in a crisis, the pilot's decisions in choosing an emergency landing site are diminished as the airplane's height diminishes; in this manner, open territories ought to be given in areas where airplanes fly over not exclusively to lessen populace density, however, to help save lives on the plane itself. As a general rule, open land locales ought to be at any rate 300 feet in length by 75 feet wide (about the size of a football field) to be viewed as helpful. Such locales ought to be generally level and liberated from items, for example, structures, overhead lines, and huge trees and posts that can send the plane wild at last. Parking garages, while not perfect, likewise can be considered adequate open terrains in urbanized settings (Alternative et al., n.d.).

4.2 Urbanization and transport system

1. Recommendation for an inclusive public transport system

Keeping in view the current land use development designs just as spatial, administrative and request related limitations on urban transportation, this study generally suggests the accompanying enhancements for understanding a comprehensive public transport system (Adeel et al., 2016):

- Enhancing public transport accessibility
- Improving affordability and quality of the service
- Innovative use of ITS in traditional public transport
- Gradual improvement of BRT
- Integration of paratransit system
- The active role of transport and planning agencies

The following short term and long term measures are proposed especially for Rawalpindi (Tahir Masood et al., 2011):

- Rawalpindi local government has been improving the roads and should continue accordingly. Where conceivable, provide new walkways and bicycle tracks and improve the current ones.
- Identify and manage the HOT Spots that cause automobile overloads and accidents.
- Improve further the working of traffic police – preparing, better advantages, more vehicles, and better innovation to do authorization.
- Plan a multi-modular transport system.
- Implement the plan for the new international airport at the earliest opportunity.
- Expand and improve the research facilities at the Pakistan National Research Center and Military College of Engineering (Transportation Cen).

4.3 Landuse Change and Its Impact on Watershed Hydrology

1. Recommendation for flood mitigation

The present review recommends that for effective and sustainable flood management, the Government of Pakistan especially Rawalpindi needs to (Aslam, 2018) and (Student, 2014):

- Improve and approve flood strategy and laws alongside their effective implementation.

- Integrate flood management that incorporates flood counteraction, readiness, moderation and vulnerability decrease into a national development strategy, plan and program.
- Develop and actualize broad community mindfulness raising projects to educate the community about flood hazards and readiness for floods.
- Strengthen flood organizations, interagency coordination, instruments and limits at national and nearby levels.
- Continue to improve the specialized ability to forecast and caution against all sources of flooding.
- Develop and execute a national adjustment intend to manage climate change impacts. For this reason, GoP ought to give sufficient budgetary assets to the Ministry of Climate Change and furthermore put resources into the capacity development of climate experts.
- Establishment of meteorological and flood management information dissemination system for mass-media, TV, Radio, newspapers, etc.

4.4 Site planning techniques

1. Recommendation for the urban and environmental development system

On the basis of the above analysis following are recommended to enable urban planning to ensure sustainable development in Pakistan.

- By correcting the urban planning process each local body is made dependent to get ready urban and ecological improvement plans for their own zones. The local organization will be made liable for planning and endorsement of the development plan and for viable structure and development control in its territories.
- Uniform planning and natural principles be encircled which applies all through the zone of the territory. The guidelines and methods arranged by the Pakistan Environmental Protection Agency under the Pakistan Environmental Protection Act for environmental clearance of the development project are too bulky and whiling to utilize henceforth these are not being executed and in this manner, should have been corrected as none of the housing plans in Rawalpindi has not gained environmental clearance before their development.
- Urban and environmental development plans ought to be readied keeping in view the target population. Inside these plans, projects be proposed likewise.
- In urban and ecological improvement designs Real Projects be proposed and financed in genuine terms.
- To advance the implementation of mitigation programmes campaigns on ecological issues and projects and plans be confined.
- Provision of mandatory acquisition of land for public purposes, for example, housing for low salary gathering, railroad lines, rail route stations, sewerage treatment plants, Landfill destinations, and trunk sewers be made in Land Acquisition Act and the local office be enabled in this association.
- A far reaching strong waste management system be made a fundamental part of the Urban and Environmental Development plan and furthermore the monetary help.
- The arrangement of the utilization of renewable sources of energy like solar energy in the nation is modified as abundant sun shine is accessible in Rawalpindi.
- Water ought to be metered and charged appropriately. Water preservation systems and their treatment to keep up the great nature of water ought to be made obligatory.
- For isolation of the loss at the source level, the local office will plan a battle and dispatch to persuade the occupant to isolate the loss into two classes.

4.5 Social and environmental impact assessment

1. Anticipated measures during pre-construction and construction

Following is the description of mitigation measures envisaged during the Pre-construction and construction Phases:

Land Acquisition and Resettlement: Mitigation measures will include land management and giving judicious compensation to the influenced by giving adequate budget in the project cost. The procedure of acquisition and compensation will be followed in a straightforward way to limit the effects.

Social Issues: Mitigation measures for the development stage will incorporate legitimate traffic diversion plans, proper safety signs, and ideal fulfillment of the project. The plans will be imparted before the initiation of construction activities through nearby media. During the activity, the arrangement of passerby intersections at each bus stop has been given to diminish the burden of the public for crossing.

Public Utilities: Mitigation measures will include:

- Incorporate technical design features to minimize the effect on public utilities; and

- All public utilities likely to be affected by the proposed project need to be relocated/rehabilitated well ahead of the commencement of construction work.

Community Health and Safety: Mitigation measures will include:

- There should be proper control of construction activities and oil spillage of vehicles.
- The labors having different transmittable diseases should be restricted within the construction site.
- Efforts should be made to create awareness about road safety among the drivers operating construction vehicles.
- Timely public notification of planned construction works.
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity & social links.
- Seeking cooperation with local educational facilities for road safety campaigns.

Electricity/ Water /Natural Gas /Fuel Consumption: Mitigation measures will include:

- Water meters will be installed to assess water consumption and water sensors at taps to avoid wastage in case of leakages.
- The plumping system will be checked and maintained on monthly basis.
- Installation of Korean technology toilets that enable the reuse of sink water in the WC will be ensured. Similarly, in Korea, most buildings have wastewater treatment plants installed in the basement for water conservation.
- Use of solar panels to generate electricity.

Traffic Management: Mitigation measures will include:

- Proper traffic the management plan will be expected to stay away from traffic jams/public bother.
- Movement of vehicles conveying construction materials ought to be confined during the daytime to diminish traffic burden and bother to the local residents.
- Coordinated planning of traffic redirections by the traffic police and the Transport Department as per the development program with guidance ahead of time to the influenced residents and street clients.
- Construction vehicles, machinery and equipment will move or be positioned in the assigned ROW to keep away from un-essential compaction of the soil.
- Availability of persistent services of the police in the redirection and control of traffic.

Air Quality and Climate: Mitigation measures during the construction of road projects will include (GoP, 2005):

- Operating construction vehicles within agreed time periods.
- Covering wagons and skips.
- Enclosing demolition sites.
- Maintaining moisture on construction materials.
- Covering transportation and garbage vehicles.
- Controlling vehicle speed.
- Selecting transportation routes to minimize the impact on sensitive receptors.
- Covering exposed soil or storage areas.
- Limiting excavation and land leveling works to the rainy season.
- Minimizing the onsite storage time of construction material.

2. Potential environmental and social measures during operations
During operation (*Environmental and Social Management Plan (ESMP) Monsoon Monitoring Centre Pakistan Meteorological Department Islamabad*, 2018):

- Setting up a system to monitor air quality along the project area in accordance with the applicable standards/limits.
- Roadside tree plantations as applicable and feasible under harsh climatic conditions.
- Regular road maintenance to ensure good road surface condition and reduction in wear and tear of vehicles.
- Regular maintenance/checks of buses to control vehicular exhausts.

Surface and Groundwater: Mitigation measures will include:

- Ensure sewage is directed into municipal drains leading to the sewerage treatment plant.
- Protection of groundwater reserves from any source of contamination such as construction and oily waste that will degrade its potable quality.
- The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements.
- Water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected.
- Permission must be sought from relevant authorities.

Solid Waste: The mitigation measures include:

- Decrease solid waste going to landfills by segregating at the source with labeled dust bins for biodegradable, non-biodegradable and recyclable products.
- Disposal of biodegradable to the municipality for treatment.
- Clearance of reusable and recyclable waste to certified recycling companies;
- Recycle rechargeable batteries through certified companies.

5. Conclusion

Pakistan's urban approaches particularly Rawalpindi have prompted eminent accomplishments and inescapable disappointments. Over the 50-year time frame, Pakistan's urban areas have developed into megapolises and towns have transformed into sprawling cities. Enormous stretches of provincial territories have arrived at the edges of urban areas and require hard just as delicate administrations fundamental for city living. In a matter of talking this eruptive urbanization was compelled. Changes in land utilization in housing plans are frequent without prior approval by the local planning office. The housing plans are essentially a private and business subdivision of land. No guidelines are being followed for the preparation. The land is not being used because of its capabilities. Within the housing proposals, immaterial land is dispensed to green, social facilities, renovations and public buildings. Water and air are polluted due to the non-appearance of the far-ranging sewerage and drainage scheme and the disposal of solid waste. There are virtually no civilian administrations in the region. This indicates negligible oversight of planning, design and development is being exercised by the offices concerned. The solid waste created during the utilization and formation exercises is not being prepared and dumped in the appropriate street or highway methods and water vapors pollute the air and water and resource misuse. Land use change offers rising to non-conforming uses which are the reason for noise pollution and crumbling residential area nature. The contemplated city's general developmental exhibition was moderate and weak, based on the sustainability index. Indeed, even moderately executed urban areas were arranged near the fringe of poor classes. Overall environmental indicators demonstrated a declining pattern, while, an expanding pattern was seen on account of economic indicators. No huge change was seen on account of social development. The significant shame to accomplishing sustainability is the environmental requirements in various urban communities of Punjab. There is a critical need to address the environmental issues of these urban communities to improve the advancement towards sustainability. Environmental laws and acts as of now exist in the temporary and national constitutions however improper implementation is a significant obstruction.

In addition, the rapid and often unplanned and uncoordinated development of urban communities has really undermined existing transport systems and has essentially expanded the challenge of making future transport systems, especially in developing countries. In developing countries, it is to be certain that the best development in motor vehicles has been found in the previous few years and is later normal, mainly in urban areas. The impacts on the environment and society are enormous and legitimately identified with personal satisfaction and urban effectiveness. Such impacts include pollution, use of electricity, air emissions and traffic accidents. Urban transport problems are of primary importance along these lines to support the need for portability in these urban communities evolving and requiring new methodologies. As for public transport as opposed to a technical issue, it is a political issue. The specialized viewpoints are generally straightforward.

In order to ensure persuasive and effective flood management in Rawalpindi, it needs to strengthen its planning and execution, flood policy, new growth and enhancement of existing flood and drainage infrastructure Improve operation and maintenance, improve institutional capacity, improve watershed management, improving flood readiness, continuing to improve flood anticipation and early warning systems, enhancing and implementing incorporated flood management techniques and improving community cooperation.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.

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