BUILDING URBAN RESILIENCE

Shivgouri D. Patil[1], Kishor Talnikar[2]

[1] Department of Architecture, Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra
[2]Professor, Department of Architecture, Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra

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Abstract - The concept of Resilience is gaining importance in both academics and practice. It refers the capacity of system to maintain the basic functions and operations during the stressful conditions by resisting the changes or by adopting the changes. While dimensions like redundancy and efficiency, diversity and interdependence, strength and flexibility, autonomy and collaboration, planning and adaptability depends on social, economical, infrastructural, institutional and environmental component of resilience. It is duty of an architect to maintain the balance between all the mentioned dimensions and create resilience. They can create atmosphere in which city can face the changes in the climatic conditions and also is capable to cope the resulting impacts. The goal of this study is to recognize the responsibilities of an architect in creating ample amount of resilience in the city which later shall be applied in different geographical level. Results of the study will help fellow interested people in this study area and authorities engaged in it and calculate the threats city may face in the future. Proper planning in the system is required to upgrade the level of resilience.

***Key Words*:** Architect, Building, Climate, resilience, planning.

1. INTRODUCTION

Urban areas are in threats due to various manmade and natural calamities such as accidental fire in the cities as well as in the forests, hurricanes, and also a deliberate attack war. Built environment is in danger due to environmental degradation and increase in corporatized influence. Therefore it is nonnegotiable that creating resilience is necessary by balancing its components and attributes.

The consequences of global climate transitions, urban destruction and increase in population are threats which world faces every day. Such problems can only be solved by creating things that are safer and more efficient. The need is to learn and do advanced research and development of the concept of resilience. Creating building and urban resilience is the Overcoming challenge of architects. Personal interviews and data provides architect with necessary information to built resilience in the city.

Aim:
to understand the idea of resilience and its economical, social and ecological components.

Objective:
The goal of this study is to recognize the responsibilities of an architect in creating ample amount of resilience in the city which later shall be applied in different geographical level.

1.1 WHAT IS RESILIENCE?

The term Resilience can be explained as the capacity of city to live with transition. Resilience acts as potion to the city affected by or likely to be affected by any disaster. Therefore, throughout the discipline of architecture, resilience is considered as a proud step. The main motto for developing this concept was to protect city from various threats specially caused by water. Concept of resilience was evolved to protect built and inbuilt environment. It's one of the objective is to resist the destruction without harming the balance of nature.

Recently, in relation to global, financial, and social emergency, it has become a key concept in contemporary urbanism where citizen projects are aimed to obtain marginal increase in density, mixed use, and walkability. However, talking about resilience, more inclination is towards the ecological factor rather than cultural aspect. Resilience offers the potential to rethink assumptions and build new systems and also manages to resist the threat. In disasters, including fire, windstorms, earthquakes, and water causing threats, any structure that withstands is counted in resistant structure.

1.2 WHAT IS ARCHITECTURAL RESILIENCE?

As stated by material engineers, Architectural resilience is the ability to rise from disaster and resist the shocks. It is the technique to increase the efficiency of built and inbuilt environment to resist and get back from the injury. While designing the building according to the resilience policy the needs and services of users had to be taken into consideration in order to achieve the disaster free lifestyle.
Influential factors while planning resilience are:

- The role of the building that is of significance to the society.
- The Impact of degradation and regeneration on the premise.
- Financial significance of the structure to the society.

Climate and social conditions are important concerns for architectural resilience. The purpose of the study is to evolve the new techniques in which the built environment has the capability to be an adaptive and resilient component of the social and ecological fabric, able to lower down the economic, social and environmental losses and due to climate change occurrence and its impact. Thus, architectural resilience has to take the help of scientific and technological breakthrough, by

adopting the concept of self generating morphologies, adaptive, responsive, and intelligent behavior. Uplifting environmental Awareness and the recurrence of natural hazards striking in densely populated zones stand behind these emergent solutions.

1.3 WHAT IS URBAN RESILIENCE?

The capacity of any urban fabric to resist and recover from disaster is urban resilience. It has become an increasingly favored concept, as the urban fabric develops it becomes more vulnerable to the threats.

Urban resilience, "Capacity of an urban fabric to keep up continues its function through all threats and stresses including its residents, while improving itself to cope with the changes". Hence, building resilience in the city is the answer to all the threats. Resilient cities are built to improve livelihood and set the ecological balance.

2. RESEARCH CONTEXT AND TRENDS:

Which resilience strategy to be implied is decided according to the function of the structure is defined by Understanding context, trends, components, and dimensions of resilience assessed. Trends are going toward the process of resilience understanding by analyzing the past and current concepts. Discussions with the authorized people aim to develop plans to enhance the resiliency. The study will recognize the responsibilities of an architect in creating ample amount of resilience in the city which later shall be applied in different geographical level.

3. RISK, UNCERTAINTY AND COMPLEXITY:

Haphazard development and ecological imbalance are the main cause for risk Causes of risks. To gain employment, people migrate from rural to urban areas which results in crowding in urban areas which causes unplanned settlements disturbing the ecological balance and also the key services. In this situation, social community, living in slum areas, tend to barter the value of ecological and disaster safety for residing in the nearer proximity to gain the privileges offered by the urban settlements.

Uncertainty relates to the disasters that takes place suddenly without providing time to get prepared. Architects need to have robust approach in order to get over such uncertainties. This means taking into consideration the potential weak areas and system breakdown and giving long term solutions.

Ecological imbalance is one of the factor for uncertainty. The main reason behind unnatural deaths and uncalled threats will be increase in population and unplanned urban fabric development. Taking this into consideration it is the role of an architect to develop ample amount of shelters to occupy the migrants. Project is successful only when all the issues are tackled and also public demands are fulfilled. Therefore, creating connections between different components of city and layers is important. Inherent growth is the idea that preparedness, response, recovery and disaster risk reduction measures combine to built the cities which are safe for living. Therefore, future contingencies should also be taken into consideration.

Urban infrastructure cites to the basic systems which are important for surviving economically and socially. The design of these services consists of water, sanitation, communications, energy, and transportation, needs the preparedness for its failure, finding solutions to both operate in redundant, or least influencing to the people. An approach which focus on robust design and builds on investments in risk data and details, strategic routes, multi-sectored cooperation, and well-planned response is needed.

.The ability to sustain in known and unknown hazards is a vital characteristic of a resilient system. In planning for hazards, there is always a factor of uncertainty that needs an additional preparation and redundancy in the design of system. Enhancing resilience depends on having suitable redundancy and flexibility by providing the continuous supply for sudden episodes. Project may fail with negligent approach. Therefore, negligence results often to fail to meet those crucial requirements, whereas resilience approaches results to provide beyond minimum crucial requirements. The need for redundancy and alternate ideas increases with the magnitude and complications of an urban area. As population and density in urban areas expands the complexity of urban infrastructure increases. As magnitude of urban areas increases, the present transportation will suddenly reach its maximum capacity and cannot serve the basic requirements of the community. Which will lead to disaster, this can result to cascading failures or collocation failures.

Overload on single service results into its failure. One of the examples of such failure is electrical shutdown. Due to sudden multiple shutdowns of various services can cause threat to the residents.

Wellbeing of city is directly connected to proper management of services. High level of shutdowns is the sign of ineffective resilience. CE, therefore, raises question on the safety of residents. This event spreads like an epidemic where population is high and such events shall be prevented by effective planning of multiple services.

Talking about the concept of power loss in a loop to determine the maximum loss in the random failure in power distribution network. Probable maximum loss is the worst case estimate of loss or consequence. So to prevent this network from high risk failure we have to protect the hubs which are likely to fail. By identifying these hubs we can reduce the risk which has the greatest impact. Catastrophic failure can happen by the failure of single hub.

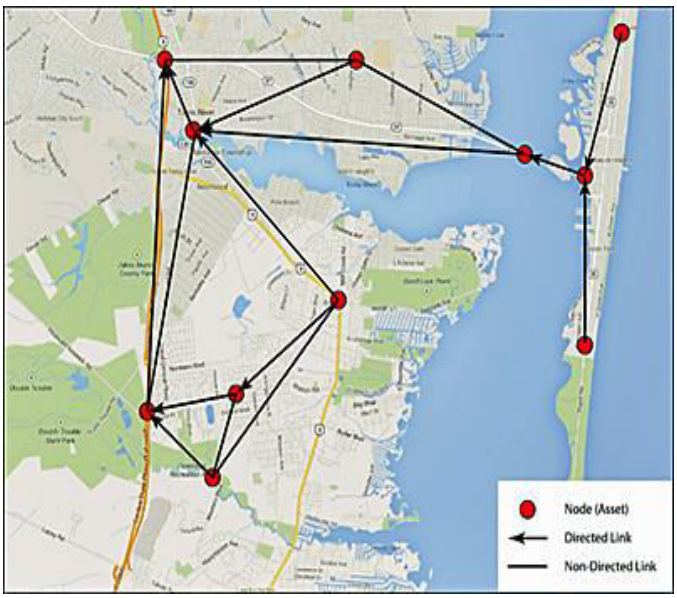
Community Network for Resilience Management

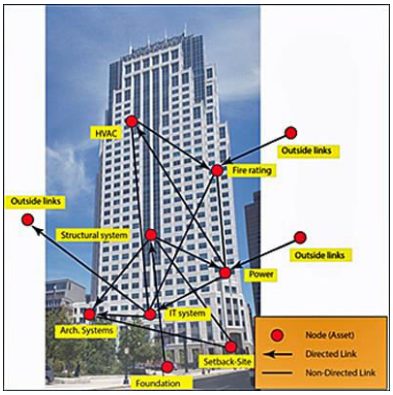
Resilience is a futuristic approach that is one step ahead of rising from failure. Increase in density is one of the reasons for facing such events. The best way to manage or avoid such events is to plan it while the basic stage of any urban development. It is the role of an architect or urban planner to list down the needs of the people and provide them with efficient solutions.

3.1 DISASTER RISK REDUCTION AND OPTIONS FOR RESILIENCE:

With the help of local authorities, architects an planner can achieve the level of resilience to protect their city from disastrous events. For city these decision makers are responsible for the things which include: guiding the people where development is taking place; providing the people with shelter and services and planning the strategies that can resist the impact of disaster. Under this level of precautions city and the people of society can be saved.

Securing the lives is challenging provided human contribution to maintain the balance of nature. Long term decisions must





be taken rather than thinking for short period of time. Hence to balance the environment, decisions must involve the public participation and leaders which will also help to grow the economy while preparing the strategies to face the upcoming disaster. To keep the people safe from threats, a combination of measures is needed, namely:

- Arranging the site surveys by the people who are willing to participate in making decisions for the wellbeing of society.
- Handing over the responsibilities to the group of people who will help the authorities to maintain the smooth operations of systems.

Disaster risk management programs guides the people to prepare strategies against the threats. Five pillars of disaster risk management are analysing the risk factors; reducing risk factor; economical factor; preparedness for events; and Post-disaster response, recovery, and reconstruction which reduces risk from future events. Planners can prepare strategies by learning past experiences. Disaster cycle clears the picture of different phases which gives opportunties to planner to prepare mitigation measures.

The mitigation phase the lessons of the previous disasters must be indentified and used so that further plannings are

FIGURE 2 The Disaster Cycle traditionally includes six phases

done in such wway to avoid the disaster.

The Preparedness Phase: in this phase the lessons are taken from past experiences and prepare the plans accordingly.

In the Disaster Phase, warnings and clearance can help to reduce losses and prepare the population to respond more quickly. Warnings allow shelter seeking for personal safety but also, if the warning period permits, it also allows quick movement of valuables, food, animals and vehicles to safer locations.

In recovery of city people are provided with shelters which are not permanent but residable till the situation get stable and medical or any needful facilities are provided.

The Reconstruction Phase: Post-disaster reconstruction includes more than the rebuilding of damaged and demolished structures and whole towns. It is an open opportunity for an architect to create new designs and use improvised construction techniques and new construction materials to build stronger and sustainable structures. Like in any other architectural project, post-disaster reconstruction look forward to the needs of the occupants and users of the built premise, also the needs of the people and cities affected by disaster. Cultural, social and environmental contexts are also need to be taken into consideration.

Recovery generally takes months or years, especially in urban region, where it is difficult to shelter affected people during the reconstruction phase. To understand the role of an architect in the post-disaster reconstruction phase, we need learn the stages of this process and the issues and possible solutions which should be considered.

There are two approaches to reconstruction after disaster:

1. Transitional shelter where the approach focuses on upgradable, transformable, mobile and recoverable shelter.
2. Multi-phased where the approach focuses on duration more than on quality and consists of three stages:

- Emergency response: Immediate shelter like tents provided immediately from the first week of the emergency for about three weeks or a month.
- Relief, the short-term or mid-term response: Temporary shelters like prefabricated units are used during the period between the emergency and the permanent housing, which is usually from two months to six months after the destruction.
- Recovery, the permanent solution: The reconstruction of permanent shelter, which require years. Mostly during third stage, architects get involved; instead they should make remarkable contributions during all stages of reconstruction.

In the process of designing for post-disaster reconstruction, architects also must take into account the normal conditions and aim on quality of work and sustainable solutions, and not just to match deadlines. Architect should develop pre disaster reconstruction programs we can implement when disaster strikes to avoid having to surrender to time constraints while rebuilding.

3.2 COMPONENTS OF RESILIENCE:

- Social resilience consists of social entities such as individuals, organizations or communities including their sex, age, ethnicity, socio economic status – and their capacities to tolerate, absorb, emerge with and fit in to environmental and social hazards of various kinds.

  To meet everyday basic development or poverty reduction needs is the most sustainable urban investment in building social resilience that has been found. The people who lives in slum areas suffer more dur to lack in services leaders and public must work together to enhance the quality of lifestyle. The advantages of the same to overall improvements can be experienced in urban governance, infrastructure and services.
- Economic resilience relates to the capacity of any city to overcome the disaster and stand again by providing the opportunities to the people for regenerating the commerce. .
- Infrastructural resilience refers the threat to all the build forms in the city and streets along the city .
- The environmental component is the study in which all the threats are taken into consideration which can city face.

Hence, by analyzing the risks, solutions can be drawn to keep the city safe from ecological disturbances.

3.3 BUILDING RESILIENCE:

For the help to a construct disaster proof building, Building resilience concepts are emerging today's architectural practice. In this buildings are constructed by planning according to the harms it can face. The strategies that create resilience are lead by a practical guide to organizing design decisions, as well as the outcome. The built environment has to be assessed, designed, and recovered. Some practical steps implemented to create resilience are:

- Construct the building according to the norms of net zero buildings.
- Observing risk causing factors and ranking buildings according to their performance .Creating a useful portfolio by preparing data from past experience.
- Strategies that can reduce risk must be evolved.
- To make decisions about real estate purchases or leases by using building ratings. -Identifying, buildings those that can retain less or forego coverage .
- Creating norms that can prevent from threats for building .

4. CITY RESILIENCE:

City resilience is the capacity of the city to resist the threats and continue its function. As far as cities concerns, the gap between disaster threat reduction and climate change adaptation is filled by the resilience. Resilience aims on improving the performance of a system in the face of various hazards, instead of preventing or mitigating the loss of assets due to threats the city faced. It is the duty of an Architect to plan for city. Cities are planned according to the needs and factors that can enhance the economy.

The idea behind this concept is to learn the connection city and its components.. Hopefully, in the future, this concept will be helpful for the city to develop to resist the events.

- Architects and planners need to collect all kind of information to build up a clear picture of the relevant threats and their outcomes. Hazards information can be obtained in many places to identify the loopholes.
  The principal types of information provider are: Affected communities and stakeholders; disaster management agencies, planning members and other ministries and departments; National / international scientific research and monitoring organization, other

non-state organizations like libraries, insurance companies, newspaper etc.
Planners sometimes have used incomplete or outdated data sets. (For example, in 1990s the Kathmandu Valley Earthquake Risk Management Project started working with insufficient data. Instead of investing time on carrying out further research, they used previous geological and seismological data, matched the procured data to the current state of infrastructure and the planned to built environment and remodel an existing loss estimation method to the Kathmandu context.)

- Land use planning based on risk to avoid threats . While episodes which are untold, relatively less threatening and frequent events that cause the damage which shall be considered while planning, Small threats can follow to become disasters if people make hazard-prone areas their home where critical infrastructure and emergency response are inadequate. While it is responsibility of an architect or planner to plan accordingly.
- Streets and Overall Spatial Structures:
  The streets and overall spatial structures are the cities most predominant components. Therefore, decisions regarding to these components should have long-term planning with sufficient capacity and flexibility that can last for generations. While determining the pattern of movement, the street pattern and block structure are important which highly affects the character of the area. The street pattern is reviewed to be the most resilient form of an urban area.
  Block sizes should be decided by analyzing the local circumstances and their function. It is important to

consider proposed use of land for the undeveloped site or the historical importance of the greater area. For reconstruction projects such as redevelopment sites, the existing block size is generally kept as a basis by connecting new adjoining areas to facilitate movement. However, it is more common to find small typologically more complex urban blocks at the centre, when cities are organically evolved, with blocks growing bigger and less complex as it develop outwards to the periphery.

The success of an urban area depends on good connections and networks, which affects the magnitude of activity and security. The movement structure aims on street and footpath networks that connects and combine existing built environment. New developments should consist of all modes of movement with a focus on walking, cycling and public transport. A successful movement network gives people the opportunity to choice on how they make their journey, both in the routes also the mode they choose. These qualities impact the walkability of the city, which consequently influence the sense of place and economic activity that takes place on a given street or within a neighborhood.

- In the Cities with less buildable space, Architects and planners have an opportunity to incorporate planning strategy of high- density developments that can have a number of social, economic and environmental benefits such as: saving cost in land, infrastructure , save energy, lower down economic costs of time for travel, lower downs crime rate and enhance safety, the restoration of green spaces, decrease emissions, enhance physical activity, and improve social connection, Advantage of high-density developments is to overcome limited land stock while building extremely diverse resilient neighborhoods.

4. CONCLUSION:

The overall aim of this study was to identify strategies creating the building and also the quality of urban resilience that contribute to increasing a city's level of urban resilience. This has been achieved through the study's five components. The paper includes important definitions and policies in the current agenda. It encourages the need for distributed resilience through the built environment and building capacity for learning robustness, innovation and adaptability. It favors the development of long term plans while generating a level of flexibility to allow for natural evolution and modification due to changes in number of residents, economic rearrangements, technological advances, change in lifestyle and change in climate. It also encourages the need for cities to absorb and sustain to sudden short-period changes from episodes like an economic crash, earthquake or flood.

Architect can provide open spaces throughout the city that can improve the physical and mental health of its people; it also improves the microclimate and also contributes in reducing in the effects from climate change. Economic resilience is achieved from morphological levels. Permeable streets with good public spaces create walk able communities, which helps enhance footfall and gain revenues. Mixed use multi-level developments reduce infrastructure costs and increase efficiency of building and land. Green spaces and open spaces increase value of property. Benefits can be achieved by an architect within the city when modifications focus on social, economic and environmental elements associated with the built environment.

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