

Disaster Management and Housing Geography of Srinagar Metropolis - The Case of 'A City of Environmental Vulnerabilities'

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Abstract: *Disasters are as old as human history but the dramatic increase and the damage caused by them in the recent past have become a cause of national and international concern. Over the past couple of decades, the frequency and magnitude of both natural and manmade disasters has climbed inexorably all over the globe. The scenario in India is no different from the global context. The Jammu and Kashmir state is a multi-hazard prone region and the capital Srinagar is highly vulnerable to various disasters. While studying about the impact we need to be aware of potential hazards, how, when and where they are likely to occur, and the problems which may result of an event. Although the occurrence of natural disasters can't be stopped but their impact can be reduced. The significance of present study lies in the fact that the present structure of the Srinagar city, its problems and the magnitude of the problems, to be faced by it in future especially related to urban housing growth indicate that the city is heading towards a critical situation of no return. Apropos this, the prime focus of this paper is to study the urban Housing Geography of Srinagar metropolis the capital city of Kashmir and thereby suggest some revival measures for urban management of this metropolis vis-à-vis disaster management.*

Keywords: Housing Geography, Disaster Management, Srinagar Metropolis, Urban Planning, Environmental Vulnerabilities

1. Disaster Management- Theoretical Background

It is accepted fact that, disasters are as old as human history but the dramatic increase and the damage caused by them in the recent past have become a cause of national and international concern. Over the past couple of decades, the frequency, number and magnitude of both natural and manmade disasters has climbed inexorably all over the world. From 1994 upto end of 20th Century, reported disasters average was 428 per year but from beginning of 21st century, this figure went up to an average of 707 disaster events per year showing an increase of about 60 per cent over the previous years. The biggest rise was in countries of low human development, which suffered an increase of 142 per cent. The scenario in India is no different from the global context. The super cyclone of Odisha (1999), the Gujarat earthquake (2001), the Tsunami (2004), Uri-Muzafferabad earthquake, Kashmir (2005) and recent Kashmir Floods (2014). The state of Jammu and Kashmir is a multi-hazard prone region and the capital city of Srinagar is highly vulnerable to various types of disasters. While studying about the impact we need to be aware of potential hazards, how, when and where they are likely to occur, and the problems which may result of an event. Although the occurrence of natural disasters can't be stopped but their impact can be reduced.

In India, 59 per cent of the land mass is susceptible to seismic hazard; 5 per cent of the total geographical area is prone to floods; 8 per cent of the total landmass is prone to cyclones; 70 per cent of the total cultivable area is vulnerable to drought. Apart from this the hilly regions are vulnerable to avalanches/ landslides/hailstorms/cloudbursts. Apart from the natural hazards, we need to know about the other manmade hazards which are frequent and cause huge damage to life and property. It is therefore important that we

are aware of how to cope with their effects. The Indian subcontinent is among the world's most disaster-prone areas. Almost 85% of India's area is vulnerable to one or more natural hazards, such as cyclones, earthquakes, droughts, floods, and landslides. The eastern part of India is prone to cyclones, the interior of the Himalayas is prone to earthquakes, the Ganga-Brahmaputra plains are prone to floods, and the states of Rajasthan and Orissa are prone to droughts. We have seen the huge loss to life, property and infrastructure a disaster can cause but let us understand what is a disaster, what are the factors that lead to it and its impact.

Disaster: The term disaster owes its origin to the French word "Desastre" which is a combination of two words 'des' meaning bad and 'aster' meaning star. Thus the term refers to 'Bad or Evil star'. A disaster can be defined as "A serious disruption in the functioning of the community or a society causing wide spread material, economic, social or environmental losses which exceed the ability of the affected society to cope using its own resources". A disaster is a result from the combination of hazard, vulnerability and insufficient capacity or measures to reduce the potential chances of risk. The process involving activities that helps us prepare for disasters and their harmful after-effects is known as 'disaster preparedness'. A disaster can affect us directly or indirectly, and although Government and Non-Government organisations like Red Cross, the United Nations, etc., are involved in the rescue process, the first one to respond to a disaster must be the affected communities.

Hazard: There is a difference between a hazard and a disaster. A hazard, in simple terms, is a potential disaster, something bad that can happen. For example, a flood is a hazard, but if we are not prepared and the result is the destruction of homes and lives then the flood is a disaster. Hazard may be defined as "a dangerous condition or event,

Volume 8 Issue 2, February 2019

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that threat or have the potential for causing injury to life or damage to property or the environment.” The word ‘hazard’ owes its origin to the word ‘hasard’ in old French and ‘az-zahr’ in Arabic meaning ‘chance’ or ‘luck’. Hazards can be grouped into two broad categories namely natural and manmade.

- 1) Natural hazards are hazards which are caused because of natural phenomena (hazards with meteorological, geological or even biological origin). Examples of natural hazards are cyclones, tsunamis, earthquakes and volcanic eruption which are exclusively of natural origin. Landslides, floods, drought, fires are socio-natural hazards since their causes are both natural and man made. For example flooding may be caused because of heavy rains, landslide or blocking of drains with human waste.
- 2) Manmade hazards are hazards which are due to human negligence. Manmade hazards are associated with industries or energy generation facilities and include explosions, leakage of toxic waste, pollution, dam failure, wars or civil strife etc.
- 3) Vulnerability: Vulnerability may be defined as “The extent to which a community, structure, services or geographic area is likely to be damaged or disrupted by the impact of particular hazard, on account of their nature, construction and proximity to hazardous terrains or a disaster prone area.”

Types of Disasters

- a) Natural Disasters: Earthquakes, Floods, Droughts, Cyclones
- b) Man-Made Disasters: nuclear disasters such as atomic explosions, nuclear meltdowns, biological disasters such as use of biological weapons, chemical disasters

Preparing for a Disaster

- Man-made disasters can be avoided by abiding to the laws established by national and international governments and organisations, staying alert, and being prepared.
- Nuclear disasters can be avoided by respecting nuclear non-proliferation agreements made between different countries to use nuclear resources in a safe and regulated manner.
- Adhering to safety measures also helps us avoid man-made disasters.
- Natural disasters can also be mitigated, and Disaster Management helps us adapt to nature and use it safely.
- Spreading awareness about the importance of being prepared for disasters helps us create a resilient society.

2. Disaster Risk Management

Disaster Risk Management includes all measures which reduce disaster related losses of life, property or assets by either reducing the hazard or vulnerability of the elements at risk.

Disaster Management Cycle

Disaster Risk Management includes sum total of all activities, programmes and measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses. The

three key stages of activities that are taken up within disaster risk management are:

1) Pre-Disaster (Before a disaster)

Activities taken to reduce human and property losses caused by a potential hazard. For example carrying out awareness campaigns, strengthening the existing weak structures, preparation of the disaster management plans at household and community level etc. Such risk reduction measures taken under this stage are termed as mitigation and preparedness activities.

2) During Disaster (disaster occurrence)

Initiatives taken to ensure that the needs and provisions of victims are met and suffering is minimized. Activities taken under this stage are called emergency response activities.

3) Post-Disaster (After a disaster)

Initiatives taken in response to a disaster with a purpose to achieve early recovery and rehabilitation of affected communities, immediately after a disaster strikes. These are called as response and recovery activities.

Srinagar Metropolis- Development Highlights

Bhat (2008) advocated that unplanned inefficient and uneconomic ribbon extension of Srinagar city along main roads sprawling out of a highly concentrated core and sporadic growth on the fringes with vast tracts of vacant lands have resulted in the disjointed urban form which is highly uneconomic to serve and extremely difficult to manage for an average sized municipality. To re-confirm the urban dynamics phenomena of Srinagar city, Yousuf (2012) while analysing the process of urbanization stated that it is happening universally and will continue. We are faced with a choice between planned and unplanned urbanization. Planned urbanization requires a holistic and multidisciplinary approach. Srinagar city is the largest urban entity in the entire Himalayan region in terms of population and constitutes the most urbanized district as well. The city despite its physical threshold and constraints is likely to expand and grow. In case the growth is not channelized and regulated it is likely to intrude towards a settlement pattern characterizing of unorganized, unplanned mess and haphazardness. The author further emphasized scale of the urban problems in Srinagar city is enormous and the situation is worsening due to unorganized - unplanned urbanization and related social trends. Continued wealth inequality, increased immigration, increased part-time employment, and independent family trends have all contributed to growing urban problems in Srinagar city. A number of housing clusters have mushroomed in and around various locations of Srinagar metropolis, in haphazard and unplanned manner, without a proper layout and devoid of service lines and other essential facilities. These unauthorized developments are encroachments on land parcels belonging to Government bodies, public- private-institutions or areas meant to be ‘Green belts’.

The existing urban problem of Srinagar, which requires immediate attention, would assume challenging propositions in case not addressed and taken care of at proper time. The City has been growing at the hands of Realtors and Land Mafias and thus there’s no planning. Ultimately, this

(growth) is obviously going to be more of problem than solution. 'No one is paying heed' to Master Plan (2012-2032). Zoning wasn't adhered to in the past nor is at present. For that matter, we have commercial complexes in residential areas, educational institutes in commercial, residential areas in green belts and likewise. It is literally a mess everywhere with no exception from any locality within Srinagar city. The finding by London-based City Mayors Foundation's report (2011) putting Srinagar city at 92nd rank out of some 300 fastest growing urban centers worldwide is quite a revelation. It is a sure wakeup call for the J&K government in general, and its urban planners in particular. It connotes a lot for all of us. At one level it means that the city's human population growth and horizontal expansion have reached high levels. At another level, J&K state would require an action-oriented Master Plan which would take care of the city's diverse municipal and other amenities in the coming decades. The city has lost its greenery and aesthetic beauty to an alarming level. Any urban development policy needs to have a major environmental conservation plan which must focus on reviving the city's greenery and environmental aesthetics. We are fast losing land at the hands of urbanization. There is little space left for expansion of the City. After around a decade or two people will have to opt for flat system as little or no land will be available for construction of houses in Srinagar. A time has also come when the state's policy makers and urban planners need to think about the introduction of Floor Space Index concept for Srinagar so that its horizontal growth could be checked. Given the speed of Srinagar's horizontal expansion, critical wetlands and other flood absorption basins have come under grave threat. Therefore, massive concerted efforts need to be made with best of administrative actions and deft political handling for the sake of our future generations is what the author suggests.

Apropos to this, in an attempt to the study the urbanization-its trends and dynamics in Kashmir valley, Yousuf and Shah (2014) examined the nature and characteristics of primacy of the Srinagar city using Index of Primacy, for analysis of urban centres of the state, especially Kashmir. Whereby, they argued that the phenomenon of primacy is extremely strong in J&K state; since, the single largest city i.e. Srinagar, a primate and characteristically diversified city, serves as a regional centre in the vast catchment, and hence acts as a strong pull factor for demographic migration. An attempt to analyse the housing, economic, sociological and historical atlas of Srinagar city was pioneered by Yousuf & Shah (2017) with a geographical facet.

3. Significance of the Study

The very purpose of the present paper on disaster management and housing geography of Srinagar metropolis has been to analyse and examine the spatial, socio-economic, historical and related characteristics of the Srinagar metropolis- the Heart of Valley. The author thereby also aimed to suggest some revival measures for better urban management of the historic Srinagar city taking in account principles and practices of disaster management. The present city thus stands as a mirror to reflect the complex historical background of the various stages which it has passed through. Srinagar City has grown enormously in the last

twenty years. The significance of present study lies in the fact that the present structure of the Srinagar city, its problems and the magnitude of the problems, to be faced by it in future especially related to urban housing growth indicate that the city is heading towards a critical situation of no return. Therefore, present study is very significant attempt to analyze the historic Srinagar city and city planning thereof. Due to the lack of such studies in the Srinagar city, this study aims to fill the existing gap and contribute towards better housing policies and strategies in the city.

4. Aims and Objectives

- 1) The very theme of the present maiden paper on urbandevelopment vis-à-vis disaster study revolves around disaster management and housing geography of Srinagar metropolis - the Heart of Valley. Apropos this, the prime focus of this paper is to study the urban Housing Geography of Srinagar metropolis of Kashmir and thereby suggest some revival measures for urban management of this metropolis vis-à-vis disaster management.
- 2) To examine the existing spatial pattern of urban history of Srinagar city.

Location of the Study Area

Srinagar city is located between 33°53'49''-34°17'14''N latitudes and 74°36'16'' - 75°01'26''E longitudes. It is the summer capital of the state of Jammu & Kashmir. It is situated at an altitude of 1585 meters above the mean sea level and spreads over the midst of an oval shaped valley of Kashmir. The city as well as its hinterland is encircled by the natural wall of mountains. Apart from this the serpentine river Jhelum traverses the city from the south-east to north-west, dividing the city into two parts.

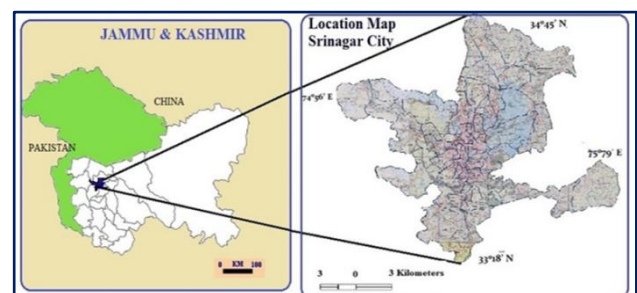


Figure 1: Location of the Study Area

Database and Methodology

The universe of the present study is the Srinagar city, comprising a total of 68 wards. The Supplementary data related to the present study has been gathered using a variety of methods to gain a better understanding of the perspectives and priorities. Secondary data were obtained from publications of different organizations and offices of urban local bodies in Srinagar city. The methodology adapted in the present study was of integrative, supplementary and complementary nature, to fulfill the set objectives related to the study area.

5. Results and Findings

Geologically, Kashmir Valley has its own importance. It is said that the Valley has undergone many changes in its geological times and falls within the geological history of mountain building movements in the country. Whole of the Valley formed part of the Geosynclinal Thethy's even upto the Permian times when it was a region of calm and quite sedimentation and suffered many violent changes. Valley of Kashmir though a very small field of study in Geology reveals one of the finest developments of the stratified records of all ages from Achaeon and Pre-Cambrian onwards to Tertiary and Recent times. It is also said that Kashmir is a tectonic valley an exaggerated dun-lying the synclinal through between two anticlinal flexures (PirPanjal and Zanskar ranges) in the middle of the Himalayas.

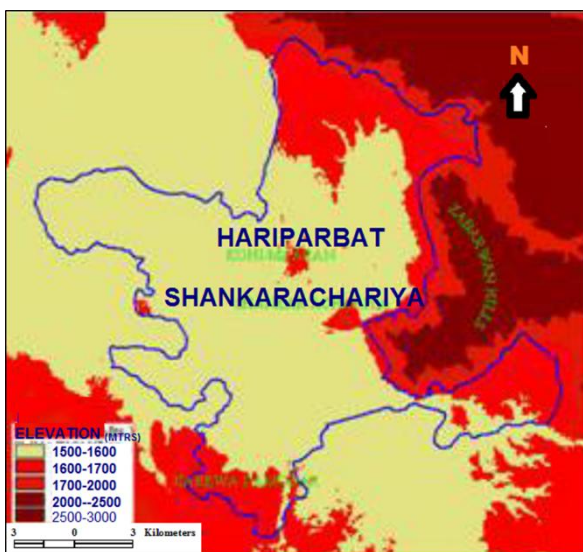


Figure 2: Srinagar City: Elevation Zonation
Source: Generated from SOI Toposheets, 1971

Greater Srinagar or planning area of the city which forms core of the valley presents an interesting physical morphology and peculiar personality. In south east and south west it has Kerawas which is said to be lacustrine and fluvialite origin and upheld a strong mythological tradition of the existence of a vast lake "Satisar" occupying entire floor of the valley in the post tertiary period. These are characterised by ravines, canyons, thick deposits of conglomerate, sand and gravel with alternate lamination of different colours and grains.

The Geological formations of Srinagar area and stratigraphic succession is worked by Raina and Kapoor (1964) which is given in Table 1.

The Valley floor which form part of the city is filled with alluvium and fluvio-lacustrine deposits cover nearly 90 % of city area. The present water bodies of Dal, Nagin, Manasbal and other wet areas are believed to be remnant of the "Satisar Lake". These water bodies have been segmented by the process of siltation and escaping of water. The geological history of the Valley also indicate the uplifting of the mountain ranges of which Zabarwan mountain is a part which acts as the major physical threshold for the expansion of the city in the east. It is characterized by abrupt changes

in gradient, accompanied with facetal spurs which is suggestive of recent mountain building process.

Table 1: Geological Succession of Srinagar City

Formation	Lithology	Age
Alluvial deposits Karewa beds	Sandy clay, gravel etc blue, grey & buff silts, sand etc	Recent to sub-Recent Pliocene to Upper Pleistocene
---- Unconformity ----		
Triassic Formations	Limestone, Crumbling shalesetc	Lower, Middle & Upper Triassic
Zewan Series	Cherts and shales	Permian
Gangamopteris beds	Shales, Limestone, Chertsetc	Lower Permian
Panjal Trap	Andesite, basalt etc.	Upper Carboniferous
Agglomeratic Slates	Sandstones, Shales, Slates	

Source: (Raina and Kapoor, 1964)

The city experienced more or less uninterrupted growth during the modern period through the successive five year plans. Srinagar city which was initially a religio-administrative centre has now been transformed into multifunctional city (Bhat, 2008).The history of urban improvement in Srinagar dates back to 1886 C.E, when the first municipality Act was passed. Archives reveal numerous Master Plansincluding Master Plan (2012-2032) that has been formulated recently, highlighting various aspects of unplanned urbanization of the city and suggests certain corrective measures in the form of allocation and relocation of certain land use categories. However till date not much of this has been implemented.

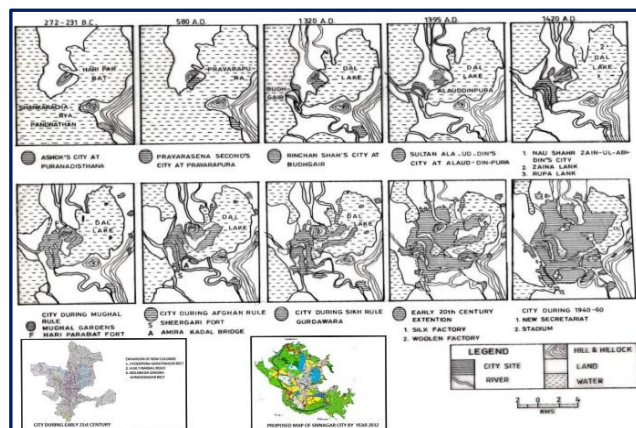


Figure 3: Evolution of Srinagar City (272 BCE- 2032)

Source: Modified After Town Planning Organisation, Jammu and Kashmir, Srinagar (2016)

The analysis of the demographics of Srinagar city, reveals that Srinagar city has been the largest urban settlement of Kashmir valley throughout the ages and continues to be the same event at present.

According to first census (1891) Srinagar city recorded a total population of 118,960 persons. During the last century the population of Srinagar city (1901-2011) has been phenomenal, it increased from 122,618 persons in 1901 to 1147617 persons in 2011, indicating nine fold increase amounting to 692.18 percent growth. In the early decades from 1901-1961, the growth has been slow due to the low growth rates which has declined from 22.46 percent in 1931

to 15.71 percent in 1961. Post 1961 a new phase of growth of population commenced. A study of the changing density of population reveals that these have been large scale fluctuations during the inter censal period from 1901 to 2011.

Srinagar City has grown enormously in the last twenty years. The area of the city has increased from 12.80 Km² in 1901 to 291.8 Km² in 2011. It is well documented that Srinagar city that post 1971, the city expanded at a faster rate with the decadal growth touching 126 percent. In contemporary period there has been an increase towards southern & northern sides viz., Hyderpora-Peerbagh, H.M.T, Nowgam, Sanatnagar belt, Pampore, Gulabagh-Ganderbal corridor.

6. Conclusion

To cope up with the consequences of natural hazards, certain policies have been framed up which include the Disaster Management Act, 2005, under which the Government of Jammu and Kashmir has constituted:

- 1) The State Disaster Management Authority (SDMA),
- 2) The State Executive Committee (SEC) and
- 3) The District Disaster Management Authorities

But still there are certain grey areas which need to be addressed on war footing basis like: Responsibility and authority must be clearly defined within organizations and sufficient resources allocated. The general level of understanding, capacity and commitment must be increased by information sharing and training at all levels. The experience of the past disasters can be used as a lesson for the preparation of the future ones. The plans and policies should not only remain on paper, but strict measures should be followed in order to implement them.

7. Inferences and Suggestions

- 1) Srinagar city is the largest urban entity in the entire Himalayan region in terms of population and constitutes the most urbanized district as well. The city despite its physical threshold and constraints is likely to expand and grow but ironically there is directionless growth of the city. In case the growth is not channelized and regulated it is likely to intrude towards a settlement pattern characterizing of unorganized, unplanned mess and haphazardness.
- 2) The urban primacy analysis of Srinagar city infers that impetus must be provided to generate newer growth centres and the existing ones must be revived. Proper investments in developmental sectors like infrastructure, education, occupation is needed, which will relieve existing pressure on Srinagar city.
- 3) The City has been growing at the hands of Realtors and Land Mafias and thus there's no proper planning, even if there is something that is messy planning. Ultimately, this (growth) is obviously going to be more of problem than solution. It is very pertinent and vibrant that 'No one is paying heed' to Master Plan (2012-2032). Zoning wasn't adhered to in the past nor is at present.
- 4) Even if some of the milestones in urban development have been achieved, still a lot needs to be done. An Urban Housing Policy, with an impetus whereby inner

city areas would systematically decrease in population, the middle areas remain almost static and the surrounding outer areas increase, is needed.

- 5) Also it is highly recommended that for proper planning of Srinagar city an Urban Information System (UIS) must be developed for Srinagar City.
- 6) To carry out Hazard, Risk and Vulnerability (HRV) Analysis and mapping using GIS to plan and prepare for disaster mitigation at micro levels.
- 7) Efforts will be carried out to be in a state of disaster preparedness and the plans prepared in this regard will incorporate the inputs of all the stakeholders for integration into the planning process.
- 8) All possible care will be taken to adopt a bottom up approach for better understanding and operation of the plans.
- 9) The observance of Earthquake guidelines and Building Codes will be made mandatory in all laws related construction of buildings.
- 10) All building relating laws shall be reviewed for ensuring safe construction regime so as to prevent loss of life and property during disasters.

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