1. RELEVANT BACKGROUND INFORMATION ON KOLKATA

Calcutta was established and developed as a City from 1690 onwards and was the erstwhile Capital of the British Indian Empire. It is flanked on the west by the Hoogli River, a branch of the Ganga, and was then flanked on the east by the Circular canal and the marshy Salt Lakes area. During 1900 it had an area of 20547 acres of which a vast green central park called the Maidan took 1113 acres. In 1901 it had a population of 847796 in its strict core area and was the second most populated city in Asia and the British Empire. Later its area expanded to include many suburban Municipalities and in 2001 it was renamed as Kolkata. It is now the capital city of West Bengal State of India.

The soil on which Kolkata is built is formed by alluvial deposits of the Gangetic Delta and has alternate layers of sand and clay. Often during early summer, dusty squalls followed by spells of thunderstorm and heavy rains lash the city, bringing relief from the humid heat. These thunderstorms are convective in nature, and is locally known as Kal baisakhi (Nor'westers). Humidity averages 78%.

The wetlands surrounding the city in the west and south-west are now mostly filled up by urban expansion.

Kolkata Municipal Corporation area has registered a growth rate of 4.1%, which is the lowest among the million-plus cities in India. But still for its size, the growth is high.

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calcutta (UA)</td>
<td>3.62</td>
<td>4.67</td>
<td>5.98</td>
<td>7.42</td>
<td>9.19</td>
<td>10.86</td>
</tr>
</tbody>
</table>

The above data excludes the 5% approximate increase in day time population of the City due to influx of day-commuter white-collar and blue-collar workers into the city. This “invisible floating” population suffers the most when civic amenities are disturbed by a disaster.

CITY GOVERNANCE SYSTEM: The Kolkata Municipal Corporation (KMC), (formerly the Calcutta Municipal Corporation), established in 1876, is responsible for the civic maintenance and infrastructure of Kolkata. The city is divided into 141 administrative wards that are grouped into 15 boroughs. Each of these wards elects a councillor to the KMC. Each borough has a committee consisting of the councillors elected from the respective wards of the borough. The Corporation, through the borough committees, maintains government-aided schools, hospitals and municipal markets and partakes in urban planning and road maintenance. The corporation as the apex body discharges its function through the Mayor-in-Council, consisting of a mayor, assisted by a deputy mayor, and ten other elected members of the KMC. The mayor is responsible for the overall functioning of the KMC and has a tenure of five-years. The city also has an apotitical titular post, that of the Sheriff of Kolkata. The Sheriff presides over various city-related functions and conferences. Another ancillary civic body is the Kolkata Metropolitan Development Authority (KMDA) responsible for the statutory planning and development of the Kolkata Metropolitan Area (KMA). The KMA includes a large suburban hinterland around the urban centers of Kolkata. As the capital of the state and the seat of the Government of West Bengal, Kolkata houses the West Bengal Legislative Assembly, the Secretariat (Writers’ Building) and the Calcutta High Court. Kolkata also has lower courts; the Small Causes Court for civil matters, and the Sessions Court for criminal cases. The Kolkata Police.
headed by the Police Commissioner and exercising both police and magisterial powers, comes under the West Bengal Home Ministry. The city is administratively divided into five police-zones subdivided into 48 local police stations. The city elects 3 representatives to the Lok Sabha (India’s lower house) and 21 representatives to the state Legislative Assembly. The State Urban Development Ministry advises and part-funds KMC and KMDA works.

KOLKATA HAZARD RISKS:  NATURAL:- Kolkata falls under seismic zone-III, while the wind and cyclone zoning is “very high damage risk” due to proximity to Bay of Bengal. The cyclone season is May-October. Tidal upsurge affects river adjacent low-lying areas of Garden Reach, Tollygunge, Khidderpore. Water-logging and flooding during heavy rains is a recent problem which is partly man-made due to bad sewerage. Devastating cyclone history records are traced back to 1737, 1842, 1864, 1867. Devastating earthquake is traced back to 12.06.1897 when 1300 houses were broken and a Church fell. Impact of earthquakes having epicentre in Bihar and Assam are also felt here.  MAN-MADE: Fire hazards are common in market areas and old building areas. Some historic fires are traced in Bowbazar, Burra Bazar area and the famous Star Theatre was incinerated. Health epidemics are common due to crowding and poor sanitation in some areas. Historical records of cholera out breaks exist. Two new manmade hazards are subsidence of soil combined with exhaustion of sub-soil drinking water due to overexploitation and non-recharging; and air-pollution leading to increased respiratory health problems. Pollution is a major concern in Kolkata, and the Suspended Particulate Matter (SPM) level is high when compared to other major cities of India, leading to regular smog and haze. Another recent phenomenon is Urban Terrorism due to heterogenous culture and nearness to porous International borders. The 1993 Bowbazar Explosion case is famous and killed 63 people.
Tabular Representation of Natural Hazard Vulnerability of Kolkata

<table>
<thead>
<tr>
<th>DISTRICT</th>
<th>STATE</th>
<th>Wind &amp; Cyclone Zone</th>
<th>Earthquake Zone</th>
<th>Flood Zone</th>
<th>Overall Risk Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolkata</td>
<td>West Bengal</td>
<td>VeryHigh(B)</td>
<td>III</td>
<td>High</td>
<td>Very High(B)</td>
</tr>
</tbody>
</table>

There are two major areas from where Calcutta remains under threat from natural calamities. First, the city sits on a highly active seismic zone. Second, since it is located in the coastal belt, it can experience storms like the 1999 super-cyclone in Orissa. The unplanned filling up of the wetlands to the East which was the natural slope for drainage of Calcutta and the non-renovation of the canals surrounding Kolkata has exacerbated its vulnerability.

TABULAR REPRESENTATION OF HAZARDS & VULNERABLE AREAS:

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>VULNERABLE AREAS OF KOLKATA</th>
<th>VULNERABLE COMMUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td>Areas to the South of the City, Along the Hugli River and nearer its mouth lie on a more Seismic zone, being nearer to Epicentre. However whole city is in Seismic Zone 3.</td>
<td>Middle class people in low quality high rises; Poor people in Slum shanties; People in old houses as Kolkata has many Such old/ dangerous ill-maintained houses.</td>
</tr>
<tr>
<td>Tidal Upsurge</td>
<td>Low lying areas near the River Hugli Eg Garden Reach, Kidderpur, Tollygunge.</td>
<td>People, mainly poor or lower middle class Living in shanties and old houses in congested areas near the channels.</td>
</tr>
<tr>
<td>Cyclone</td>
<td>Exposed areas near the Maidan, South Calcutta and River adjacent West Kollkata</td>
<td>Tile roofed houses; Houses near big trees; Kuccha houses of shanties.</td>
</tr>
<tr>
<td>Flooding &amp; Waterlogging</td>
<td>Major parts of the city, including Camac Street, Amherst Street, Theatre Road, College Street, M G Road, Ultadanga, Kankurgachi, Phoolbagan, New Alipore, Southern Avenue, Rashbehari Avenue, Deshapiya Park, Sovabazar, Shyambazar and AJC Bose Road remained flooded in the July rains.</td>
<td>Single storied houses at level lower than Road, Kucha Houses, Houses in low water collecting areas like end of flyover/bridges.</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>Congested old areas in North-West Kollkata, Burrabazar, All old markets at Kalighat, Posta,Gariahat.</td>
<td>Schools, Shops in Vulnerable areas; Old houses with old wiring, Old multi offices in congested buildings of Esplanade.</td>
</tr>
<tr>
<td>Health Epidemics</td>
<td>Congested slum and poor mens zones in most parts of the City except Central Zone.</td>
<td>Slum-dwellers, Lower Class. Aged / Children.</td>
</tr>
<tr>
<td>Air Pollution</td>
<td>The Heavy traffic and Business Zones in and around Central Calcutta, Esplanade, Gariahat.</td>
<td>Daily Commuters in Bus; Traffic Police &amp; Drivers. Old/Sick people &amp; Child</td>
</tr>
<tr>
<td>Land Subsidence &amp; Water layer loss</td>
<td>Machhua Bazar, Calcutta University and Raja Bazar Science College area is subsiding at the rate of 6.5mm/yr. The Central and Eastern part of the city is losing subsoil drinkable water.</td>
<td>Highrises and old houses in Subsiding Zone; Poor people dependant on tubewells for drinking.</td>
</tr>
</tbody>
</table>

A STORY OF HOW THE TIDAL UPSURGE EFFECTED Kolkata Urban Agglomeration WHEN COMBINED WITH RAINS:

‘Sarasari Ban’, the highest tide of the year, hit coastal West Bengal on in September 2006, flooding several low-lying areas in south Kolkata. The inundation was accentuated by the rains, causing waterlogging in many places. The tide, around 6.59 m high, reached Garden Reach at 12.58 pm. Tidal waters entered Kali Temple Road and flooded several adjoining areas. Kalighat temple, however, remained unaffected. The tide was accompanied by heavy rain in the morning and early afternoon. Till around 1 pm,
Mominpur recorded the highest amount of rainfall (27 mm). The Palmer Bazaar drainage pumping station recorded 22 mm rain during this period and Manicktala dps recorded 17 mm rainfall. Despite the waters reaching high levels, areas which have been regularly flooded during this period were spared the onslaught on the first day of the high tide. Areas like Harish Chatterjee street and Harish Mukherjee road remained dry as the tidal waters remained two feet below Tolly’s Nullah but with continuing rain these areas got flooded.

COMMENTS ON HOW THE HOUSING PROBLEM OF THE POOR INCREASE VULNERABILITY OF KOLKATA:

The city has an acute housing shortage. Of the persons living in institutional shelters in the Calcutta Metropolitan District, more than two-thirds live in the city itself. About three-fourths of the housing units in the city are used for dwelling purposes only. There are hundreds of bustees, or slums, where about one-third of the city’s population lives. A bustee is officially defined as “a collection of huts standing on a plot of land of at least one-sixth of an acre.” There also are bustees built on less than one-sixth of an acre (one-fifteenth of a hectare). The majority of huts are tiny, unventilated, single-story rooms, often dilapidated. They have few sanitary facilities, and there is very little open space. In 1981, 3.24 million (35 percent) out of 9.16 million residents were classified as slum dwellers. Overcrowding has reached virtually intolerable proportions in many sections of the city. These areas accentuate risks due to poor sanitation, drainage and socio-economic weaknesses.

B. KOLKATA’S CURRENT DISASTER RISK MANAGEMENT SYSTEM:

ROLE OF GOVT/AGENCIES IN DISASTER MANAGEMENT: This being the Capital and an old city, multiple agencies having their seat here play a role in disaster management in the city. But the key role is played by the Kolkata Municipal Corp and the Kolkata Police. Also in major events the Chief Minister and other key Ministers jump into the fray.

The KMC has 141 Wards and 11 Boroughs and its Sewerage and Health and Relief departments play the Key Role in the Disaster Stage; while the Planning Dept with the Mayor Council plays role in pre-Disaster Stage. The KMC is responsible for administering and providing basic infrastructure to the city.

- Water purification and supply
- Sewage treatment and disposal
- Garbage disposal and street cleanliness
- Solid waste management
- Building and Maintenance of roads, streets and flyovers.
- Street lighting
- Maintenance of parks and open spaces
- Cemeteries and Crematoriums
- Registering of births and deaths
- Conservation of heritage sites
- Disease control, including immunization
- Public municipal schools etc.

KMC Depts.’s that play Key Roles in DRM:

1. Sewage treatment and disposal
2. Building and Maintenance of roads, streets and flyovers

KMC has three authorities:


The number of members of the Calcutta Municipal Corporation was to be 141 which elected Councillors from the 141 wards.

The Corporation as the apex body discharges its function through the Mayor-in-Council, consisting of the Mayor, Deputy Mayor and 10 other elected members of the CMC.
The Corporation groups the wards of the Corporation into Boroughs. Each Borough has a Committee consisting of the Councillors elected from the respective wards of the Borough. The Councillors elect one of them as the Chairperson of the said Borough. The Borough Committees are subject to the general supervision of the Mayor-in-Council, and look after functions such as water supply, drainage, collection and removal of solid waste, disinfection and health immunisation, bustee services, lighting, repairs of certain categories of roads, maintenance of parks, drains and gullies.

The Relief Ministry, recently renamed as Disaster Management Ministry, plays a guiding and supportive role. The Police Commissioner and his team are the backbone of field execution and field coordination of activities during Disaster Stage. The Fire Brigade, renamed as Emergency Services, with its good network of 20 Fire Stations in the city also plays a key role.

The KMDA funded by the Govt., ADB, Foreign Agencies develops and executes masterplans for disaster alleviation in Greater Calcutta. KMDA, is the statutory planning and development authority for the Kolkata Metropolitan Area (KMA) under provision of the West Bengal Town and Country (Planning & Development) Act, 1979. Initially formed under a Presidential Ordinance in 1970, it is today the agency for planning, promoting and developing the KMA.

KMDA's role is multi disciplinary - it is the agency of city planning, it sculpts new areas and townships, it develops physical infrastructure as well as provide basic services like water, drainage, waste management. Besides these KMDA is also the Technical Secretariat to Kolkata Metropolitan Planning Committee (KMPC), being the first of its kind in India, constituted under the West Bengal Metropolitan Planning Committee Act, 1994.

ROLE OF MEDIA & COMMUNITIES IN DISASTER MITIGATION: This being a literate and cosmopolitan city having seat of most media offices, these have heavy influence in generating public awareness and increasing the level of community participation in disaster management. The public opinion reflected in these media surely keeps the responsible agencies alert. Kolkata has nine local FM stations: AIR Kolkata (FM Rainbow & FM Gold), Radio Mirchi (98.3 MHz), Red FM (93.5 MHz), Aamar FM (106.2 MHz), Gyan Vani (105.4 MHz), Big FM (92.7 MHz), Power FM (107.8 MHz) and Friends FM (91.9 MHz). The state-owned television broadcaster Doordarshan provides two free terrestrial channels, while four MSO provide a mix of Bengali, Hindi, English and other regional channels via cable. The FM Radio with its live participatory feedback system on current issues and the local TV channels promptly showing effected areas, increase Community mobilization in Disaster Preparedness. Infact these offer an excellent opportunity for Public-Private Partnership in developing a CBDRM regime.

Kolkata being a 300 years old city has its big network of local clubs and well-established voluntary organisations like Red Cross, St. John’s, Community Relief Societies, Ramkrishna Mission, Bharat Sevaram Sangha, ISKON. These have big, well equipped centres in the city. The combined effort of these wellknown Societies, assisted by the local mohalla clubs of youth, are a formidable parallel force in their own right to tackle disasters. But they always work in close liason with Government Agencies.

But currently the media and these voluntary organisations are more active at the start of disasters and the ongoing and post disaster stage. But these have the potential to do preparatory and mitigatory jobs like spreading the awareness of safe/ best practices for the Community Based Disaster Mangement Concept and training and organising trained volunteers. Hence these giants still have a lot of work to do in pre-disaster stage which is not desirably highlighted.

THE TECNO-LEGAL FRAMEWORK & STATE OF DISASTER MANAGEMENT PLAN ;Though the KMC and the key agencies mentioned above have a rudimentary Disaster Management Plan, it is not visibly effective as it is not Field Tested, rehearsed and well-publicised. It also lacks Standard Operating Procedures. All this, coupled with the lack of coordination and cohesiveness of command, often leads to a bit confusion and delay in starting operations though these are not acknowledged and also not so much felt as multiple agencies and voluntary organizations jump into the fray. Even the Resource website www.irdn.gov.in does not list much Plan/Resources for Kolkata.

| Mayor leads Relief Operations | No DRM Plan, Mainly Relief Plan | State does not still have DRM Act | The KMDA City Devn Plan does not focus on DRM but on Infrastructure | The Promoters Association CREDAI is more focused on quantity than DRM. |
Though the City is now veering towards a Disaster Risk Management Regime, but still the lack of a State Law in this regard in the lines of the “Gujarat DRM Act” is not expediting the progress. Also the KMC and KMDA are more focused on modernizing Kolkatas roads, flyovers and traffic and joint ventures to solve Housing Scarcity, than on systematic techno legal regime for DRM, which is still viewed with doubt as to be a speed breaker to immediate infrastructural development.

C. DESCRIPTION & ANALYSIS OF A RECENT DISASTER IN KOLKATA:

Recently, in continuation of the trend of last three years Heavy Rainfall exceeding 48 hours hit Kolkata leading to flooding, water logging, economic loss to civic life.

DESCRIPTION OF THE EVENT:

Officials of Calcutta say the city has received around 20% of the monsoon rain it normally gets over the last three days from 3rd of July 2007 to 5th of July 2007. The torrential rainfall is due to a depression that has developed 150 kilometers South-East of Kolkata. The heavy rainfall has already flooded almost the whole of Kolkata. At least 9 people in the city have died in floods caused by the rain. The Calcutta weather office said the city has received more than 300mm of rain since late on Monday night in two days, which increased to 410mm by third day. "Calcutta gets between 1600 to 1700mm of rain every monsoon and now he have got so much rain in just three days," G Debnath, chief of the local weather office said. Few taxis and buses could be seen on roads. The hand-pulled rickshaws are ferrying stranded residents. In short the civic and economic activities of the city were at a standstill.

Schools and colleges have been shut due to the heavy rains. Attendance in offices was low. Hospitals and universities have been flooded, while train services were disrupted. The city's IT hub, which has the offices of many multi-national companies, was also hit. Many factories were forced to close.

An excerpt from a National Newspaper will bring out the situation vividly:- Kolkata woke up to sunken surroundings on Tuesday morning, as the notorious monsoon unleashed with full force on the city, and flooded most of the areas. The rains continued whole night till afternoon, and almost paralysed the whole of Kolkata. The sun appeared in the late afternoon on Wednesday, only to disappear after a short while, giving way to heavy showers yet again. All through the day, the city wore a deserted look, as the citizens were forced to stay away from their activities. The rains continued even on Wednesday, further adding to the discomfort of the people. While on Tuesday Kolkata recorded 16 cm of rain in Alipore in the southern part of the city, and 17 cm of rain in Dum Dum in the northern fringes of Kolkata, Wednesday's rainfall was registered at around 14 cm in Alipore and 11 cm in Dum Dum. Major parts of the city, including Camac Street, Amherst Street, Theatre Road, College Street, M G Road, Ultadanga, Kankurgachi, Phoolbagan, New Alipore, Southern Avenue, Rashbehari Avenue, Deshapriya Park, Sovabazar, Shyambazar and AJC Bose Road remained flooded even on Wednesday, despite Kolkata Municipal Corporation's (KMC) repeated promises of "speedy drainage of water". The city resembled a sea of dirty water, with no demarcation between the roads and the footpaths. Traffic was thrown out of gear, as vehicles got stuck in the deluge. There were few vehicles on the road, and the ones that plied, charged commuters almost three
times the regular fare. The pedestrians were forced to wade through knee-deep water in most parts of the city. The rainwater flooded even the major hospitals of the city, including Calcutta Medical College Hospital and National Medical College Hospital. This resulted in chaos in the hospitals. The power supply was disconnected in many areas of the city to prevent people from being electrocuted. Most parts of the city remained without power for more than 10 hours. The people of Kolkata fumed at the poor drainage system of the city. A college student remarked, “They say rains are romantic. Where can we find romance in such filth? It's so disgusting”. Another elderly man said, “This is horrible. We have to face such hardships. The drainage system is very bad”. A housewife vented her anguish at the lapses on the part of the KMC. “Every year we have to face the same situation. The KMC makes empty promises”, she remarked. (NB: In response to all this public outcry ventilated through the Media, the Mayor was compelled to make a detailed statement on action KMC is taking to prevent future occurrence)

**ANALYSIS OF THE EVENT:** The rains started from 3.7.07 morning and within three days 410mm rain poured against annual total of 1600mm as per previous records. The rains fell just after Full Moon when tidal upsurges were causing backflow in the Canals and thus disturbing flush out of sewerage water. So the official view is that this disaster was caused by unprecedented heavy rain combined with failure of sewerage system. But we know that the whole event was compounded due to ill preparedness, lack of responsibility and focus and also due to unregulated & unsustainable urban growth at the cost of DRM principles.

With the Kolkata Municipal Corporation (KMC) and the State Irrigation Department locking horns over the maintenance of the city’s sewerage system from last few years, the roads were all set to be submerged this monsoon. Following excerpts transcribed from a leading local daily will help analyse the bureaucratic feud:

*According to KMC officials, they have done their bit in upgrading the pumping stations, and now it’s the turn of the state irrigation department to contribute their share. “We have repaired all the six faulty booster pumping stations in the city. Even if water collects, they should be drained out soon after. But now we are facing a strange problem. Even after the water is drained out, the choked canals are forcing it back on the streets,” said Member, Mayor-in-council, Sewerage,. A new pumping station is coming up on Southern Avenue for which traffic has been diverted on this stretch. According to him, the state irrigation department is refusing to clear the silt from the canal. KMC officials meanwhile warned that if the current stalemate continues this rainy season, the city might face a severe water problem also. The KMC’s filtered water supply could get contaminated. “The silt at Kestopur and Bagjola canals have reached alarming proportions and this has completely choked the drainage system. If this continues, the state irrigation department will have to answer,” he added. The State Irrigation Department, on the other hand, claimed that clearing the layers would need a high-powered dredging machine which the department cannot afford at this moment. “We do not have funds at our disposal right now. Anyway, we are looking for alternatives to solve the problem,” said State Irrigation Minister. (NB: This problem is now being remedied by the State Govt by placing funds for Canal Restoration to KMC direct as per latest news. We are waiting to see the results.)

Admittedly, rainfall has been heavier this year. But it doesn't justify the extent of flooding. Calcutta's old 'khal' or canal system, which acted as an effective drainage system for some three centuries has been silted up and encroached upon. The Calcutta Municipal Corporation admits the choked canals were a major cause of the prolonged waterlogging. During the British colonial period when three tiny settlements became Calcutta, the canals served as a means of transport and also drainage. When the Eastern Metropolitan Bypass was being built (in the 1970s) environmentalists had warned that the road would block the natural drainage of the city which slants towards the east. Today, the catchment area around the Bypass is also the hub of numerous housing colonies, built at the cost of much of the wetlands, and adding to the drainage problem. The canals are in serious disrepair, according to a recent survey. The Bagjola canal, which drains Calcutta's north-east, and the Krishnapur canal, which drains the north, are 50 to 70 percent choked, while Tolly's Nullah, to the south, is 40 percent blocked. Past attempts to clear the canals have run up against hundreds of thousands of encroachers - squatters - on the banks. Irrigation department
engineers claim that though they have submitted proposals to revive the canals, which means the squatters have to be evicted, they have been stonewalled due to political interference. The State Environment Department for the improvement of Calcutta’s wetlands and canal system has given a proposal which envisages cleaning up the entire canal network, which stretches from Calcutta to the Sunderban forests, in the estuary. Thus we see here a failure in best use of resource and timely preparedness.

Also the deluge in context is the effect of decades of unsustainable development based on building Roads, Bridges and Highrises without improving the drainage and land slope to bear the heavy effluent of houses and the stagnation of water due to obstruction of waterways/natural slopes. Infact, Governor Mr Gopalkrishna Gandhi, at the convocation of the West Bengal University of Animal and Fishery, emphasised that while urbanisation was inevitable, it ought not to be carried out at the cost of wetlands and pastures. The State Government has to take steps to maintain them. This statement has sent strong signals to State Government agencies in the field of environment, wetlands and urban development, such as the West Bengal Pollution Control Board, East Calcutta Wetland Management Authority, Kolkata Metropolitan Development Authority and the Kolkata Municipal Corporation to prevent unplanned urbanisation and protect the wetlands. The move to set up more industries even at the cost of agricultural and forest lands has resulted in the need for better infrastructure and housing development. Consequently the promoters and builders are constructing highrise apartments, shopping malls, amusement parks wherever wetlands and waterbodies are found in and around the city. In many cases, the promoters have filled up waterbodies though there is a standing law that forbids such activity. Political interference has stalled proceedings against promoters and builders who violate laws. The promoters are now building on the wetlands of East Kolkata by influencing local officials. These wetlands actually are the basin that receives the drained out water of Kolkata.

Lastly, I would like to point out that various reports are suggesting such heavy prolonged rainfalls in future due to global weather change, and now it is high time to tie up the loose ends. If this rain can effect Kolkata life like this, I shudder to think of what will happen if Cloudbursts occur as in Bombay. The Mayor of Kolkata has publicly assured us in his articles written in the popular Ananda Bazar Patrika (17-18.07.07) that work is on to remedy the situation.

D. OBSERVATIONS & RECOMMENDATIONS:

The following table will summarize the major lacunae in Kolkata’s Techno-Legal Regime:

<table>
<thead>
<tr>
<th>Lacuna</th>
<th>Description</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Law not adequate</td>
<td>1. Laws more than 25 year old</td>
<td>1. State must enact DRM Act in line with Central Model Act.</td>
</tr>
<tr>
<td></td>
<td>2. Building Bye Laws not codified</td>
<td>2. Building &amp; ULB Laws to be modified giving priority to DRM</td>
</tr>
<tr>
<td></td>
<td>4. Multiplicity of Rules and Agencies leads to confusion</td>
<td>4. Need to form a Nodal DRM Agency</td>
</tr>
<tr>
<td>Law has loopholes</td>
<td>1. The new Environment Impact Assessment Act, 2006, says that one need not</td>
<td>1. Enforce EIA and Environment Laws on all Projects.</td>
</tr>
<tr>
<td></td>
<td>take any environmental clearance for buildings that cover less than 220,000</td>
<td>2. Enforce Rainwater</td>
</tr>
<tr>
<td></td>
<td>square feet. Earlier, there was a</td>
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</tbody>
</table>
norm in the state making it obligatory to seek clearance from the board for houses larger than 60,000 sq ft or with more than 100 flats. Since Majority of the new buildings being made are smaller, they can easily evade safe Environ Standards

2. Though the Promoters Act lays down stringent Building standards, these are easily avoided by promoters who enter as hidden partners in joint ventures with land-owner and show the projects for self-consumption of landowners family, esp in small apartments.

3. There is no effective law to ensure ground water safety and rain harvesting, thus leading to groundwater exploitation and depletion.

| Stakeholder seeks nepotistic Laws | 1. CREDAI, the new big realtors union, is clamoring for changes in FAR law based on area rather than the current basis of road width. Thus they are more interested in quantity over quality. Calcutta’s FAR is 2.  
2. CREDAI is also seeking the time taken to sanction projects has to be reduced significantly. But even know the ULB is failing to check through proper building plans. So what will happen if time is reduced with existing machinery? More faulty Plans will sneak through. | 1. KMC should be cautious as to not fall for amending Law under pressure of the powerful Realtors Lobby.  
2. Changes should be brought transparently and on PPP consensus based on CBDRM. |
|---|---|---|
| Technical Standards inadequate | 1. Calcutta has always had a problem with water-logging and flooding. Basement parking only exacerbates this problem. But current standards favour that mostly.  
2. Most of the new buildings coming up are small apartments with four storey. These have no Earthquake resistant fittings and quality control of materials used. Thus unsafe buildings come up. Also fire safety norms are not implemented. | 1. Encourage Multilayer Parking in apartments.  
2. Enforce earthquake, Fire safety Norms while giving License to construct apartments. |
| Monitoring Pathetic | The Monitoring mechanism of the current techno-legal regime is grossly inadequate and corrupt. This leads to unsafe structures which also tax the sewerage and other civic facilities. | 1. Anti-Corruption Drive  
2. Vigilante Citizen |

Old Calcutta has mostly British made Brick Sewers of two types:- Man Entry Cleanable & Non-Man Tide cleanable. The rain water is cleared as follows: Drains > Sewers> Pumping Station > Trunk Sewer > Canals >River OR Wetland. Now the Sewers are on an average 50% silted up and uncleanable as it is not easy to clean them up in a busy City by conventional methods. Hence the KMC is now searching for specialists in such cleaning by modern hi-tech microtunnelling method. The added areas of new Calcutta do not have much of a planned good sewerage system even. The current 19 Drainage Pumping Stations with their 93 Pumps were still inadequate to tackle the situation. The KMC had to deploy 250 portable pumps in various areas in addition to tackle this deluge.

The KMC and KMDA have taken up two major Projects to tackle this sort of a situation in future:-

Harvesting for all Apartments and register all Tubewell/ borepumps.

3. To strictly check all Joint-Venture building deals .
1. **PROJECT NIKASHI**:- In this project last year 1.25 lakh Metric Ton desilting of sewers was done and this year 1.5 lakhs MT has been already done. New Pumping Stations are being setup in new vulnerable areas like Ultadanga.

2. **Kolkata Environment Improvement Plan (KEIP)**:- This is a Asian Devn Bank funded Project of Rs.2000 Crores to restore Sewers, canals and build new ones.

But since the aim of a mitigation strategy is to reduce losses in the event of a future occurrence of a hazard (Structural mitigation may comprise construction of individual disaster resistant structures like retrofitted or earthquake-resistant buildings or creation of structures whose function is primarily disaster protection like flood control structures, canal restoration, sewerage upgradation etc.), hence the KMC should also think of all these parameters and action areas instead of solely focusing in Sewerage Engineering. We are yet to see much activity here. Also all areas can not be treated alike and scientific Microzonation should be taken up by GIS method irrespective of political considerations. The objective of microzonation is to establish geological and geo-morphic units of the city and its neighborhood, including assessment of soil characteristics and bedrock configuration. It also helps detect, delineate and characterize major and minor faults that are seismically active.

I also feel that the approach should be a judicious mix of Community Based Disaster Management with Engineering Maneuvering. The KMC has wakened up to Engineering Maneuvering mostly.

### A CBDRM APPROACH TO NATURAL DISASTER MITIGATION IN KOLKATA

<table>
<thead>
<tr>
<th>HAZARD</th>
<th>PREVENTION</th>
<th>MITIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake</td>
<td>Retrofitting old buildings, Legislation &amp; Enforcement on Safe Highrises.</td>
<td>Microzonation of Areas, Community Awareness, Early Warning System.</td>
</tr>
<tr>
<td>Tidal Upsurge</td>
<td>Bunds on River Channels, Drainage.</td>
<td>Early Warning System</td>
</tr>
<tr>
<td>Cyclone</td>
<td>Retrofitting Building Roofs, Green Belt Baricade Creation</td>
<td>Safe Houses/Shelters, Community Awareness, Early Warning System</td>
</tr>
<tr>
<td>Flooding &amp; Waterlogging By Heavy Rain</td>
<td>The city has a old canal system on its flanks Which were natural drains. These must be restored. The natural eastern slope towards Salt Lakes need to Less concretized and culvert built under the obstructing Roads.</td>
<td>Community Awareness, Early Warning System Better Pumping System Cleaning of drains/sewer.</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>Fireproofing Houses by Expert Checking Creating safe zones and exit paths</td>
<td>Community Awareness, Early Warning System, Fire drill.</td>
</tr>
<tr>
<td>Air Pollution</td>
<td>Enforcing Pollution Control; CNG/Battery as alternative fuel,</td>
<td>Increasing Green Belt, Community Awareness</td>
</tr>
<tr>
<td>Land Subsidence &amp; Water layer loss</td>
<td>Proper Microzonation &amp; Soil-testing and Building Regulation in effected areas. Prevent further water tapping.</td>
<td>Soil filling/ subsoil treatment. Rainwater harvesting &amp; recharging of subsoil layer.</td>
</tr>
</tbody>
</table>
Awareness, preparedness, safe behavior play a crucial role in reducing vulnerability. In fact though we have major thrust in Community Based Disaster Management work ongoing in villages, the same zeal is not noticed in today’s cities despite them having better literacy and ground factors for such work. And as too many cooks spoil the broth, the lack of a Nodal Officer for Disaster management in cities and existence of too many over important agencies creates chaos in implementing CBDRM. Disaster mitigation starts with the attitude of individuals and communities towards everyday's risk. Lack of personal sensitivity to risk impairs societal effort in urban vulnerability reduction. Thus, risk mitigation starts with the development of a culture of prevention that installs primary ownership of societal protection with the individual.

Since the Urban Disaster Risk Mitigation is a Pre Disaster Stage Work mostly, the other new roles of the Govt lies in the following CBDRM approach stepwise:-
1. Street/Ward wise Participatory Appraisal planning by involving locals to collect data on the area, history, pinpointing Vulnerable and safe Structures and Practices, creating a Microplan Map by guided collaboration of local stakeholders indicating escape routes and logistical key points also.
2. Validating and incorporating the above plan with the City administrators Master Plans and modified fusion/merger to form a grass-root stakeholder understandable and executable plan. Here the effectiveness of the Plan will lie in wide publicity, acceptance and convincing the other Actors, Civil Societies.
3. Developing a acceptable Early Warning System and citizens participatory drill so that all stakeholders understand and execute the safe steps on activation of EWS.
4. Developing the Local Action Volunteer Groups for Disaster Management Activities and properly training and equipping them. Then regular morale boosting liaison to keep these Groups active.
5. Publicity to increase Awareness on Disaster and Safe Practices and creating a understanding amongst the opinion-builders of the communities on these and the Governments new approach to DRM and need to effect the changes.
6. Since in Cities, due to close grouping and sanitation issues etc, the Health Factors are mostly effected in a Disaster and Health Hazards are compounded in all forms of disaster, separate stress should be given in Health Level risk Mitigation issues.

TO CONCLUDE, I shall stress on these points about Kolkata Disaster which I feel is important:-
- Greater Kolkata consists of KMC and 71 small Municipalities. A disaster in any part effects the other. Hence a Dedicated Nodal Agency for Disaster Management should be immediately set up for this region.
- The Government must enact the DRM Act and upgrade its Manuals of Relief. A SOP is needed also for each DRM agency. (Govt is now publishing a New DRM Manual)
- The approach should be a judicious mix of Community Based Disaster Management with Engineering Maneuvering.
- The Law must be changed to incorporate Safe DRM practices in Urban Development. Scope of PPP should be included in the Municipal Laws.
- GIS should be used in further urban development to stop unscientific and unsustainable damage to existing natural drainage/slopes, wetland/catchment areas.
- Though Rain induced flooding is the current hot topic of discussion, we should not overlook the slowly emerging issues of Air Pollution, Groundwater Resource depletion (Recently Central Water Board told Calcutta High Court that in recent years Kolkata’s water level has reduced by 7-11 meters and is fast depleting due to massive over exploitation combined with non-recharging), and land subsidence due to erratic construction. On weak soil. If we do not start working on these then these will become Frankenstein’s like today’s Rainfall-flood issue.

-------END---------

(REFERENCES USED: KMC/ KMDA Websites, Calcutta Gazetteer, Manual of Relief, NIDM-WBI Courseware, ABP & Times of India, BBC, Various Websites and Magazines, SPAGE leaflets etal.)

(Submitted by SAMANJIT SENGUPTA, GROUP A, SL. NO. 9.)