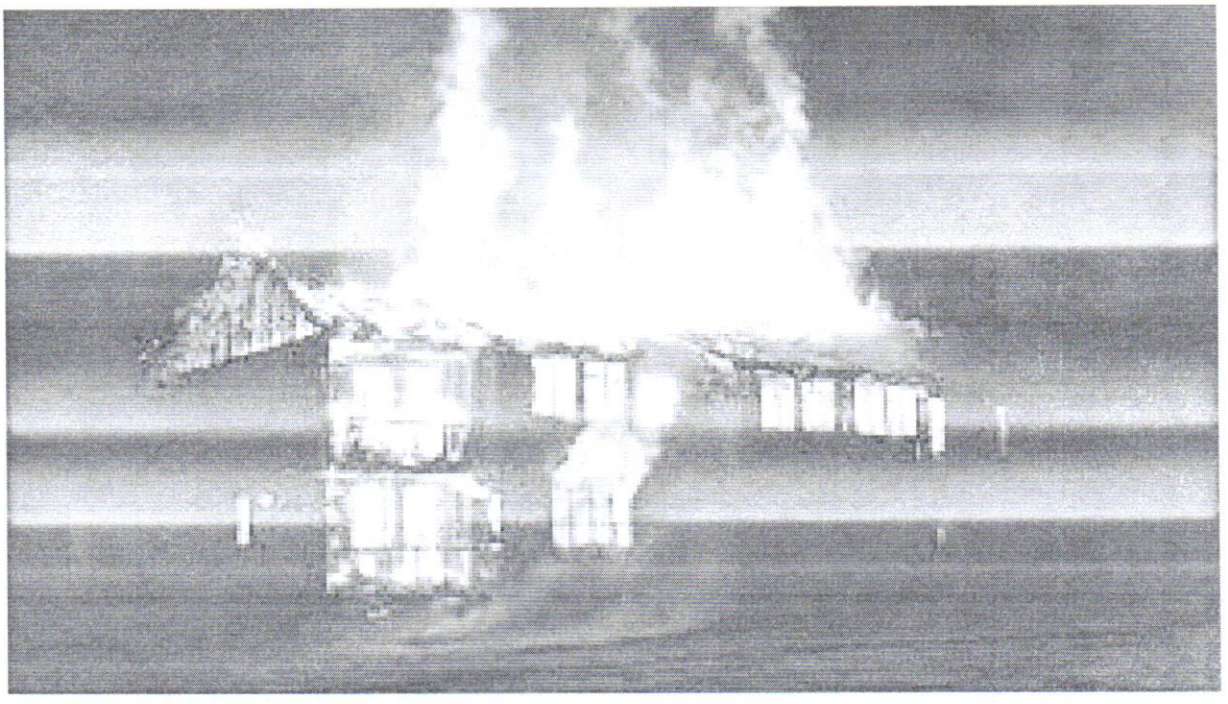
RISK ANALYSIS OF AN EFFECTIVE FIRE HAZARD: A STUDY IN KOLKATA MUNICIPAL CORPORATION (KMC) AREA, W.B,INDIA



UNIVERSITY OF CALCUTTA
SEMESTER- 6
PAPER CC-14 GEOA
ROLL NO. 213532-11-0032
REGISTRATION NO. 532-1212-0708-21

Paper Name : Hazard & Disaster Management

TITLE

RISK ANALYSIS FOR AN EFFECTIVE FIRE HAZARD : A STUDY IN KOLKATA MUNICIPAL CORPORATION (KMC) AREA , WEST BENGAL , INDIA .

ACKNOWLEDGEMENT

I would like to express my gratitude and appreciation to all those who gave me the possibility to complete this report. Special thanks is due to Prof. PUJARINI GHOSH ma'am, whose help stimulating suggestions and encouragement helped me in all time of fabrication process and in writing this report. I also sincerely thanks for the time spent proofreading and correcting my many mistakes.

Also I would like to express my gratitude to all the professors of Geography Department of Dhruba Chand Halder college, for helping me to complete this report.

Bubai Nankar.

PRINCIPAL
Dhruba Chand Halder College
P.O.- D. Barasat, P.S.- Jaynagar
South 24 Parganas, Pin- 743372

CONTENT

LIST OF TABLES

OBJECTIVES AND METHODOLOGY

Literatures of geography on fire thematic are somewhat limited. However, a number of studies mainly by the scholars of other disciplines have been done in the different part of the world. Hazard and its consequent disasters in the remote sensing ... that can be applied for environmental resources mapping and modelling. [illegible] et al (2007) have discussed about the remote sensing technique in assessment of fire hazard. ... al (2006) have used remote sensing technique with the assumption that it has great potential for ... as an effective technology with the ecological effects of ... dists and managers seeking to map, predict and assess the ecological effects of fire. De Vliegher and Basigos (1995) have prepared fire hazard modelling using remote sensing and GIS with the case study in Greece. Picotte and Robertson (2010) have attempted to test the accuracy of Remote sensing technology in forest fire damages.

The present study is an attempt to focus on :

(a) The investigation of actual and potential fire hazard prone areas of the KMC.

(b) Construction of GIS data base and generation of thematic maps to study the risk and management strategies of the hazard.

Thus, The Methodology includes:-

(a) preparation of fire zoning map of the KMC area based on fire frequency.

(b) Identification of the class of fire situated within the fire zone as well as water body ;.

(c) preparations of road maps according to their width and also produce the alternative road during the traffic congestion, applying different shade of colour.

Geospatial analysis techniques are used to process the collected data (both spatial and non spatial) to represent various parameters. Network analysis for FSM has been prepared and a Large scale LULC Map (Anderson et al, 1976) (Table-1) has been prepared with the help of the base map.

TABLE 1 : Remote sensing data products used in the study.

SL	DATA TYPE	RESOLUTION (m)	SOURCE	YEAR	DATA FORMAT	APPLICATION
1.	LANDSAT (MSS, TM, ETM+)	15/30	USGS	2016	Raster	urban LULC map.
2.	ASTER	15	USGS	2011-15	Raster	Preparation of the image.
3.	IRS (LISS-III+PAN, LISS-IV, IRS-P5 PAN, AFT+IRS P6 LGMX)	2.5/5.6	USGS	2011-14	Raster	Identification of the inland waterbodies
4.	GEO EYE	0.5	Google Earth	2015-18	Raster/ vector.	Identification of the Location of fire events, network analysis.

THE STUDY AREA

The KMC is located at 22°32′ N of latitude and 88°20′ E of longitude [illegible] and is one of the oldest urban centres developed by the British.

Kolkata is a pioneering city in India in terms of industrialization, and also one the most important cities of the country to serve the national economy, polity and culture. It is characterized by a large number of migrants perhaps [illegible] communal harmony and political stability (Basu and Sil, 2000). [illegible] growth of population the land use pattern has been changing with the shrinkage of [illegible] to be replaced by the ever increasing residential commercial as well as industrial and international institutional areas. It is very important to have clear knowledge about the physical structure of the city to reach quickly to the fire-affected place. The Kolkata city may be conveniently divided by into two clear segments:

1. The relatively older parts of the city located in the central and northern parts.
2. The peripheral built up areas in the east, south and the south-western parts.

These two areas have different urban characteristics. The older parts are characterized by poor urban infrastructure, although having close proximity to the CBD. On the other hand the 'outer crescent of the city', exhibits planned urban developments with primarily residential built up areas (Dhar, 2013). It seems difficult for the quickest arrival of the fire fighters at the fire affected place in Kolkata because road space is very less in the city, but vehicular density is very high (about 800 vehicles/km), which often creates traffic congestion in the major roads.

In general, there is an indivitual fire extinguishing system is almost every apartment, hospital, industry and other installations against small fires at the nascent stage. But unfortunately, there is major infrastructural lacking and communication gap between fire events and their management especially for the large scale fires. In many cases it is noticed that the department of fire and emergency services is not properly informed. Sometimes narrow roads do not permit to enter the big fire engines and very often fire fighters have to fetch water from distance place.

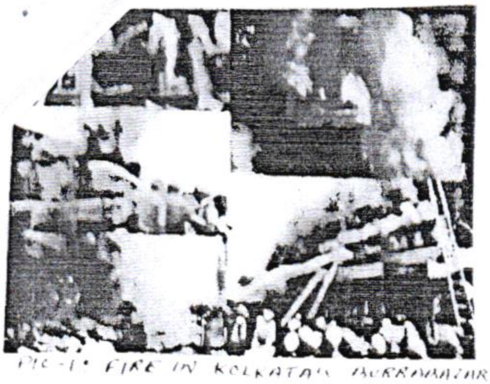
It is not very uncommon that there were two fires in the same year. such in ward No. 32 (2006, 2011), ward no. 61 (2009) and ward no 63 (2012). There were many wards which experienced only single fire event. the fire events in hospital only were four (2.28% of the total), but it had a great impact on the society. the victim hospitals included SSKM Hospital (in ward no 95, A-type fire) in 2012, Amri Hospital (ward No 26, A-type fire) in 2011). Chittaranjan cancer Hospital (ward no 58, C-type fire) in 2014), and kolkata college and Medical college and Hospital (ward No. 30, C-type fire) in 2018.

. From the zoning map (fire zoning map) (fig-), we can delineate the type prone areas of the KMC into four zones, zone-I; 0 fire or <1, zone-II, 1-4 no. of fire, zone-III, Number of fire 5-9; & zone-IV, No. of fire 10-14, for the time period of 2006-2018. Under the KMC area, 50.69 % wards belongs to zone-I, which lies mainly in the South and Western parts of the city. (Table-).

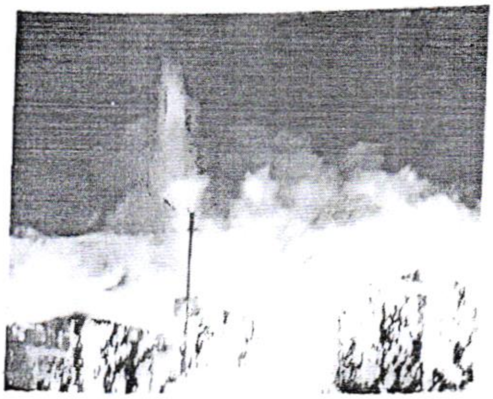
TABLE 3: DISTRIBUTION OF WARDS IN DIFFERENT FIRE PRONE ZONES

FIRE ZONE	WARD NUMBERS OF KMC	TOTAL	IN PERCENT
ZONE-I	1,4,5,8, 12,14, 17,23,24,28,30,36,41, 47,48,51,52,68 71,73,74,75,76,77,78,79,83,84,85,86,87,89,91 93,94,95,96,97,98,99,101, 103,104,109, 110,111,112, 113,114, 115,116,117,118, 119,120, 121,122, 123,124,126, 127, 129,130, 132,134,135, 139,140,141, 142,143,144,	73	50.69
ZONE-II	2,3,7,9, 10,11,13, 15,16,18,19,20,21,25, 26,27,29, 31,33,35, 37,38,39,40,42,43,44,45,46, 50,53,54,55,56,57,58,59,61,63,64,66, 67,69,71,73, 78,80,81,82,88, 90,92,100, 102,105, 106107, 108,125, 128, 131, 136, 137, 138,	65	45.13
ZONE-III	34, 60, 65	03	2.08
ZONE-IV	6, 22, 32, 62	04	2.77

PRINCIPAL
Dhruba Chand Halder College
P.O.- D. Barasat, P.S.- Jay
South 24 Parganas, Pin- 23372



PIC-1: FIRE IN KOLKATA'S BURRABAZAR



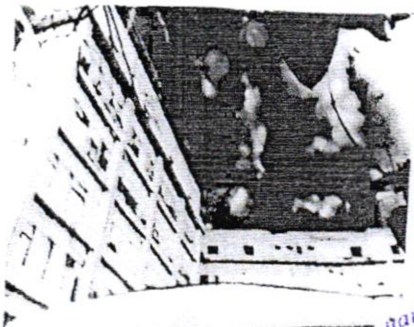
PIC-2: FIRE IN KOLKATA ... AREA

(iii) FIRE IN HOSPITAL:

Within the KMC area there are about 62 well known hospitals where thousand of patients and their companions used to go for treatment. Unfortunately these important place are also not secure in the sense of fire event as the city has experienced different life threatening fire events in hospital during the recent past. Among them four events are significantly memorable as discussed earlier.

(iv) FIRE IN MARKET AREAS AND SHOPPING COMPLEXES:

The fires of such type are mostly common in the KMC area which mostly damage property. The market area and shopping complexes are mostly vulnerable because in market area people are seldom aware about fire-safty process and a market usually maintains the minimum fires safety norms. The important markets in KMC area are: sir Gurudas Market (ward no-30), sir charles Allen Market (ward no. 18) Ultadanga Municipal Market (ward no. 13), Manton super Market (ward no. 130), Bakultala Market (ward no. 128), Santoshpur Municipal Market (ward no. 106), Ramlal Municipal Market (ward no. 106), Kalitala Bansdroni Municipal Market (ward no. 113) Gorba Municipal Market (ward no 67), Jiban Mohan Ghosh Market (ward no. 112) Baba Haat (ward no. 138), Jabbar Haat (ward no. 138), Binod chamaria & Brothers (ward no. 42), Ganesh properties pvt. Ltd (ward no. 43), Bangur charitable trust (ward no 43), Kolay properties pvt. Ltd. (ward no. 50), chanu Market (ward no. 87), New Market (ward no. 46), Gariahat Market (ward no. 68), Maniktala Market (ward no 17) etc.



PIC-3: KOLKATA SSKM HOSPITAL ...

The fire types in the market area and shopping complexes are A, B, C and D. The total number of A type fire is 79 (46.19%), B is 31 (18.12%), C is 55 (32.16%), D is 3 (1.75%), K is (1.75%) during 2006-2022. A clear idea about this type of fires has been gathered (Fig-) through intensive field work during this time period.

TABLE 4: TABLE of Different types of fire in KMC Market area:

TYPES OF FIRE	A TYPE	B TYPE	C TYPE	D TYPE	K TYPE
NO. OF FIRE EVENT (frequency)	79	31	55	3	3
% OF FREQUENCY	46.19 %	18.12 %	32.16 %	1.75 %	1.75 %

FIRE MANAGEMENT

A. PREPAREDNESS AND QUICK RESPONSE

Planning is one of the most efficient tools to deal with disasters. The quick response indicates the two step methods to include the identification of the vulnerable area and the response to it. A disaster preparedness plan should be clear, realistic, flexible, and easy to use and it must be covered every stage of disaster management cycle (Joshi and Joshi, 2005). Identification of vulnerable area and section of appropriate measures should be the first stage of disaster preparedness.

Identification of the fire victim place can be done through Gps and GDPS. The response of fire disaster demands a quick rescue operation as soon as possible. And time is a very important factor to control the fire impact. So the duration of the gap between a fire events and its rescue operation is very crucial. Moreover, the response to fire disaster is a systematic damage assessment process to restore the utilities.

B. PREPARATION OF THE ROUTE MAP :

An attempted has been taken to find out the shortest route between the fire victim wards and its nearest fire stations. Beside this, during the office time a number of alternative routes have been proposed to reach the fire affected ward to avoid road congestion. There are two wards, which have been identified for their highest fire occurrence or frequencies (fr) Ward no. 32, (frequency 18) and 34 (frequency (0).

J CHART FROM FIRE STATION TO WARD NO 32 AND 34 :

The nearest fire station of these two wards is Maniktala fire station (Ward no. 31). These two wards are situated within the 7KM buffer zone of this fire station. The shortest route direction between Maniktala fire station and ward no. 32 is given below (Fig-).

Maniktala fire station → CIT Road (W: 15 M) → Ward no. 32

In the case of traffic jam at shortest route, so, the alternative route between Maniktala fire station and Ward No 32 is (Fig-7)

Maniktala fire station → Maulana Abul kalam Azad Road → EM Bypass → Maniktala Main Road → CIT Road → Ward no. 32.

The shortest Route direction between Maniktala fire station and Ward no 34 (Fig-7, Maniktala fire station → CIT Road → Hem chandra Barkan Road → Ward no. 34.
The Alternative route / routes between Maniktala fire station and Ward no. 34 (Fig-7, Maniktala Fire station → CIT Road → Nankeldangha road → Kavi sukanta sarani → Dr. Suresh chandra Bannerjee Road → Ward no. 34 .

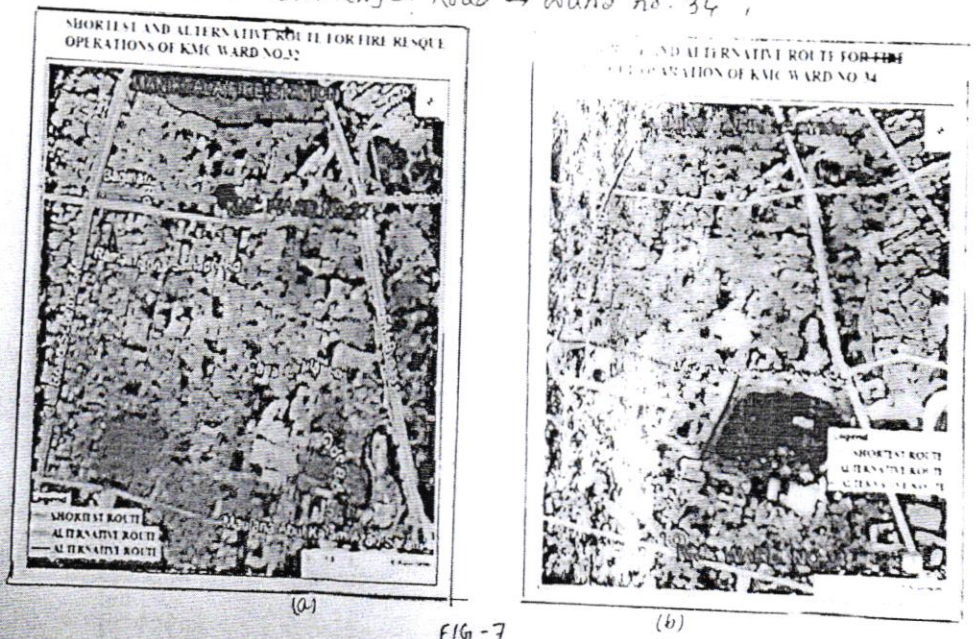


FIG-7

C. SELECTION OF THE APPROPRIATE FIRE ENGINES :

The selection of the fire engine for the fire events is an important task. The layout of the Road is an important factor for the quick rescue operation. If the selected fire engine is too big for the selected Road it can be easily overturned. The appropriate fire engine to be selected according to the road width presented below (Table-).