Fire Hazards & Their Mitigation Measures for Rural Sectors in India

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BACKGROUND HISTORY

Indian philosophers believe that the life system and the universal existence are in unification with the five basic elements of nature—the fire (Agni), water (Jal), air (Vayu), earth (Prithvi) and vaccum (Aakash). Plato also asserted that God used the four element in creation of the World. According to the ancient Vedic scriptures, fire is considered as the messenger between the people and their Gods. Traditional households in India are supposed to maintain a sacred fire for the worship of Agni, as much the ancient Roman kept a holy perpetual fire cared for by the bestal virgins and as the Greeks tended and transported the sacred fire of Hestia during migrations. The need to protect fire from contamination was also a belief in part of Africa, North & South America, and elsewhere. The Azrec of Mexico and the Inca of peru worshiped Gods of fire with sacred flames which the Inca ignited by concentrating the Sun's rays with a concave metallic mirror. Familiarity with fire has led modern civilization to take fire for granted. The original source of fire was lightning and such acquired reliable fire making knowledge in the form of friction producing element or of flint struck against pyrites besides, saws etc.

As drizzle changes into cascade, wind changes into storm/ cyclone, similarly a small fire changes into catastrophe. Not only those affected strive hard to survive but it becomes difficult for fire-fighters to control. Failure make them to believe that these are curses of nature of God. Natural events like fires, earth-quakes, floods or droughts occur in different parts of the World and only result in large scale destruction. However, the man-made creations like population growth and discrepancies in economic growth have led to the growth of underdeveloped/partially developed shelters which resulted villages and slums in big towns or cities. Non planned growth of these has resulted in devastating fires and other tragedies. These can only be minimised y concerted efforts of governmental agencies, insurance companies, research laboratories and elite society by translating research and legislation into practice.

INTRODUCTION

In its first evolutionary stages, the pattern of man's existence was tribal and nomadic. He solved his food requirements by eating vegetables or by hunting animals and moved from place to place in search of them. Natural shelters like trees, caves provided him home satisfying his primitive needs. About 10,000 years ago, he discovered the possibilities of agriculture and from than onwards new factors were introduced into his life, which restricted him movements leading to the permanent settlements as a farming community. This led to the development of nodal centres which subsequently turned into villages.

India has an area of about 3.28 million km inhabitated by more than 850 million people speaking as many as 18 official languages. The country has a stable political structure both at state and national level, sophisticated administrative system, a well established bureaucracy, a long supply of organised and unorganised trained/ untrained manpower and a fairly good organised transport and communication system. However, the fundamental problem remains to be the disproportional economic growth with ever growing population and their basic demands of food, clothes, shelter, education and employment. These problems coupled with climatic conditions and socio-political conditions at village level require special attention for their remedial measures.

The high rate of economic growth alone may help unless investments are specifically directed for creating more jobs through labour-oriented agrarian sector, development of small scale industries based on the agriculture and the locally available natural resources and also by transforming the large areas of the identified zones into the mega industrial complexes using latest technologies which would make maximum use of the India's natural resources.

FIRE PROBLEMS—FACTORS INFLUENCING THE SCENARIO

Climatic Conditions

India experiences severs summer with maximum temperatures varying in between 30°-49°C and winter

with minimum temperature ranging between 10°-20°C (applicable to most of the plain areas of the country). Extreme warm conditions make the combustible materials more susceptible to fire and the extreme winter generally forces the use of unsafe heating practices inside this or outside the shelter or house-hold.

General—Present Scenario

The low per capita income and general economic constraints are responsible for (i) use of cheap and ordinary materials for housing which are mostly combustible and unstable in a minor fire situation (ii) force people to live together in villages and under miserable environmental conditions in slums in big cities, and (iii) prevent people from buying safe materials for constructing their houses.

The socio-political conditions provide a conducive environment to fire incidents. Some of these are :

- Unsafe houses or cluster of houses which are prone for fire spread;
- Cooking on the floor with wearing long flowing fabrics;
- Thatched houses, and shamianas with temporary wiring and lighting arrangement for marriage together with gathering of large number of peoples;
- Rush to the cities and urbanisation caused by unemployment and mirage of jobs leading to uncontrolled expansion resulting in mini-village or slums in cities or near cities;
- Political activities such as rallies leading to road blockades and traffic jam and loss to the government property by arson and their subsequent redressal in villages;
- Lack of proper training at village or block level against unsafe use of naked flames specially at a time of crops cutting and its disposal;
- Inadequate fire consciousness and meagre fire safety guidance leading to frequent outbreaks.

GENERAL—FUTURE SCENARIO

As a result of new government policy of industrialisation and development at grass route level, the villages are likely to have more fire friendly environment and the factors influencing these may be in different proportion and of different magnitudes. If proper training/education is not imparted to them or at least to some of them, the rate of increase of fire incidents could be manifold. Some of these factors may be :

- Unsafe practices of using the cooking gas;
- Temporary electrical connections and unsafe use of electricity. It is worth mentioning here that more than 30 percent fires are caused by electricity.
- Uneven and unplanned development and the problem of rural unemployment may result in economic-social tension leading to fire hazardous situations especially based on arson.
- Growth of hazardous industries particularly near rural areas without any additional safety measures.

It is difficult to analyse fire problems in India and also in other developing or underdeveloping countries due to lack of reliable and comprehensive data. One has to, therefore, depend on fragmented data available with various agencies. The fire losses in our country are more than Rs. 1200 crores per year and its gravity to the affected small family is beyond description. Total number of fires may result about 3 millions, and direct material damage due to fires may result (estimated) to about 0.3% erosion of G.D.P. If the figures of the Burn Association are taken as somewhat closer to actual, fatal casualties in India are more than 20,000 per year. A comparison of deaths in India with other countries is shown below :

COUNTRY	DEATHS PER MILLION PERSON	
Switzerland	0.54	
Netherlands	0.59	
Austria	0.96	
New Zealand	1.25	
Denmark	1.37	
Norway	1.45	
Japan	1.56	
Sweden	1.68	
France	1.92	
Finland	1.92	
U.K.	2.02	
Canada	2.71	
U.S.A.	2.72	
Hungary	3.05	
India	13.00	(estimated)

It is important to note that the data from India do not include fire statistics from rural sectors until it is a major fire.

FIRE SAFETY

Fire safety implies well planned and well conceived precautions and remedial measures which either prevent or minimise the occurrence of fire resulting in minimal fatal and/or nonfatal injuries or mitigate its effects on damage. It functions by provided occupational safety in factories, offices, shops, construction sites etc. and/or for planning public safety by taking into consideration risk exposure at public places, home and transport etc.

Unfortunately a fatalistic view on fire safety is still prevailing even in the urban and industrial areas as used to be in ancient times. However, the building fires of Ansal Bhawan, Sidhartha Hotel, Gopala Tower, Vasudhara Bhawan, Vigyan Bhawan, Krishi Bhawan, Kidwai Bhawan, Uphar theater which had occurred during the last few years have created some awareness at least among the educated class who had strong feeling towards considering fire protection as undesired expenditure. It is the high time that a concerted view on fire hazards, fire prevention and fire protection in rural areas is also taken and efforts are made in the direction so that the likely benefits of the economic programme and industrialisation of Government of India may bring better and safe life to rural folk and the country would see mini-towns instead of villages which may be self-reliant and well-equipped in may respects.

A specific fire prevention programme of any nation means involvement of various segments of the society aiming at building public interest and encouragement, careful planning of safe occupancies, equipment, processes, minimisation of the causes of fire, compartmentation and for provision of active fire protection system. It also helps in building an organisation of professionals, trained employees or volunteers for emergency planning or action. In India Ministry of Home Affairs, National Fire Service College, National Safety Council, Loss Prevention Association of India Ltd., Tariff Advisory Committee (Insurance Industry), Central Building Research Institute, Defence Institute of Fire Research. The Institution of Fire Engineers (India), State Fire Services and Private consultants are actively engaged in this task. However, fire prevention policy programme requires massive investment at the national level, harmonising the conflicting interests of enforcing officials, owners, tenants, businessmen, private consultant and the periodic evaluation of the policy statement should clearly emphasize the importance of fire safety, preventation of loss of life and property and the responsibilities of concerned staff. Since fire is still a sate subject in India, we, therefore, have National Building Code Part IV for fire prevention, protection and guidance besides State or Municipal byelaws, Tariff Advisory Committee byelaws etc. A survey conducted in Delhi for finding adequacy of fire protection measures in High-rise buildings about five years back has resulted in identifying 194 skyscrapers with virtually no or inadequate fire safety provisions. Delhi Fire Service through Delhi Administration and Ministry of Home Affairs have successfully got approved the Fire Prevention Act 1986 through the Parliament making it mandatory to provide minimum fire protection measures for getting the buildings cleared for occupation. It therefore, necessitates to carry out similar exercise at some selected states especially in developed states. However, the exercise should be in totality for fire safety problems only.

CBRI VIEWS

From the research point of view, a research organisation, is need to have also the R & D priorities in the area of Rural Fire Safety which could take care of the present need of the rural sector within India and also from other underdeveloped countries from the fire hazards point of view and could also visualise the present and future requirements. This may indirectly increase the growth rate of the agriculture and industrial sectors by reducing associated fire hazards and could also plan for the fire prevention and protection measures. This may help to mitigate the degree of fire hazards for the sustained economic growth of the Rural Sector within India.

The Fire Research Laboratory of the Central Building Research Institute, Roorkee which has working on this multi-disciplinary area of fire research since last two decades may further be entrusted with additional responsibilities and with additional resource to cover the work on these aspects of the present and future scenario of rural India as it can cater the needs of planning of different segments for the mitigation of the fire hazards arising even from any natural disasters such as earth quake, cyclone etc.

FIRE PROTECTION

Fire is often an underestimated and unforeseen phenomenon of an unfortunate character with devastating potential.

The prevention of fire and resulting injuries is largely a matter of personal or management attitude and the system approach to the problem. Economically, optimum prevention measures of fire may cost less than the loss vale of resultant incident.

Fire problem is more difficult in underdeveloped and developing countries where sizeable portion is illiterate and live below poverty line and where government efforts are aimed at in fulfilling basic needs of masses, generation of employment and retardation in the growth rate of population. In India facilities are available in the form of elementary graded lessons for school children and audio visual films. However, they are just inadequate in relation to the variety and magnitude of the fire hazards associated in rural areas at present and in future.

Concerted efforts are required for imparting fire prevention policy in general and it is, therefore, worth considering here that programme may be pushed through a globally recognised organizations. India being on the threshold of industrial revolution may be able to act as coordinating agency if the active support of other developing and developed countries is made available. Fire Research Laboratory of the Central Building Research Institute, Roorkee could shoulder the responsibility of Coordination.

As we are planning to see the upsurge in the rural environment of India and the government has introduced Panchayati Raj, there is a need for the new : "Basic Fire Safety Training Programme (BFSTP) for Rural Masses" which may be started in the 3-Tier Pattern : the 1st Tier training activities may be at the "Panchayat Samiti Level" i.e. at the Taluka Level, the 2nd Tier training activities may be at the "Gram Panchayat" and/or "Nagar Parishad Level" and the 3rd Tier may be at the "Individual Rural Occupancy Level".

1ST TIER : PANCHAYAT SAMITI LEVEL

The representatives from the state administration/ schools/colleges coming under the jurisdiction of the each Panchayat Samiti of the District should be given the Basic Fire Safety Training for a short duration, say for two weeks, at the appropriate training college/ Institute. The trained representatives of the 1st Tier will, in turn, take care of the training activities of the 2nd Tier training programme with feedback to the district level administrative and the appropriate authorities.

2ND TIER : GRAM PANCHAYAT/NAGAR PARISHAD LEVEL

The representative from all the Gram Panchayats/Nagar Parishad coming under each Panchayat Samiti shall be given the Basic Fire Safety Training at the "Panchayat Samiti" or the Taluka Headquarter of each Taluka by the already trained representatives of the respective Panchayat Samitis. The trained representatives of the 2nd Tier will, in turn, take care of the training activities at the individual rural occupancy level in their own villages/localities/mohallas.

3RD TIER : INDIVIDUAL RURAL OCCUPANCY LEVEL

The representatives of each wards/mohallas of the village/town shall be given the Basic Fire Safety Training at the "Gram Panchayat" and/or Nagar Parishad Headquarter of each village/town by the already trained representatives of the respective Gram Panchayat/Nagar Parishads.

These trained representatives of the 3rd Tier will, in turn, organise the Basic Fire Safety Training in their wards/mohallas for all the individual rural Occupancies.

FIRE RESEARCH

The Fire Research Laboratory at the Central Building Research Institute, Roorkee (India) was established in 1968 as a result of decision taken by a high powered committee constituted by the Ministry of Home Affairs, Government of India.

The programme of work at the Fire Research Laboratory of the Central Building Research Institute, Roorkee is quite comprehensive and covers all aspects i.e. fire prevention, fire protection, fire limitation, fire detection and fire extinguishment.

All these would become more relevant where new thrust of government is aimed at to tap benefits of new economic policy at the grass route level. Thus these become an immediate need to take up the work on fire problems in new rural India. Some of the thrust can be as follows :

n For understanding the problem, its assessment for the economic and efficient solution, it is most important that the collection and analysis of fire statistics for purposes of problem location and identification are done with proper spade work in different parts of the country.

The emphasis should be exhaustive, realistic and problem-solving.

SAFE MATERIALS

Since a majority of Indian population lives in villages using thatching materials, such as reeds, palmyrah/ coconut leaves, bamboos, paddy straws which are combustible, it was felt necessary to make these fire-retardance for enhancing rural fire safety levels. The F.R.L. has developed a technique to render conventional thatched-roof water repellent and fire-retardant by the application of a treated mud plaster. The prototypes of these have been built in different parts of the country. The main advantages of the technique is that it does not allow the spread of fire from one part to the other, thus prevents fire breaking the continuity even if fire has taken place in adjacent ordinary thatched roof house. This prevents people to become homeless and results in minimal injuries to the people and animals.

EXTINGUISHMENT OF FIRE

It is not possible for the fire-fighting tenders to reach the affected villages in a reasonable time for the extinguishment of a fire hence the new approach and techniques should be devised to minimise the fire losses. The use of cowdung for cooking should be dispensed with, instead, the establishment of Gobar-Gas plant should be encouraged. It will, on one hand, reduce the stock of "dry-dung" for the further spread of fire while on the other hand, it will improve the availability of natural fertilizers and the non-conventional source of energy. If the single process is seen from fire safety and energy saving point of view is potential would be immense and it would result in less fire, clean atmosphere, efficient use and development at a grass route level.

The Fire Research Laboratory has been working on new concepts which will make the fighting of fires in rural areas more effective and efficient. The efficacy of the systems can be enhanced by modifying and popularising the safe cooking practices and the appliances and by using appropriate extinguishing media which could be readily and locally available to the villagers. Further the application technique should be so designed that the normal villager could use it effectively and efficiently for fighting the fire whether it is a small electrical fire or the large transformer fire caused as a result of short circuiting. Even the ordinary combustible material fire caused due to a burning kerosene lamp or by the burning end of the biri or cigarette or any naked flame creates havoc in the present circumstances. The road conditions should be properly planned.

The first aid fire-fighting appliances specially devised for the extinguishment of fire should be placed in panchayat room. Similarly, where irrigation facilities are available, these should be collectively improvised for fighting the crop fires.

CONCLUDING REMARKS

Rural economy is poised for an outright improvement. It is, therefore, imperative that efforts should be made in totality to impart proper training through audio and visual education programmes to all the rural masses through national communication media, such as Turning Point, T.V. programme for different stages in different languages. The training will result into better knowledge on fire hazard, their preventive and protective measures.

A time bound programme to assess the fire hazards in developed and underdeveloped rural area should be taken up. The team should comprise, besides scientist from the Fire Research Laboratory of the CBRI, the officers from the state governments and the small scale industries, sociologists, and local public representatives, volunteers etc. A questionnaire may be prepared which could be filled with the help of villagers during rural surveys.

The indepth study on the assessment of fire hazards and subsequent work on its mitigation will not only see the economic progress of rural masses but would also result in better life safety. Infact, it should be our endeavour that even the smallest segment of the society is aware of the risk associated with the environment and he takes advantages of scientific means while scientists and fire officials provide him the most economical means of mitigation of these hazards.

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