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The Three-Fold Cords in Rescue Operations

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Abstract:
In the fundamentals of the basis rescue operations, is embedded the major three aspects involving the disaster management entities. These include the transportation, water as well as the fire disasters. The safety of any environments or communities' rests solely and majorly on the level or the degree of managing the entire situations. Fire entails a very complex chemical process. The fire science is a branch of physical science which includes fire behavior, dynamics, and combustion. The physics of combustion determines when and where we have a fire. The diffusion flame process(fire)consists of three basic elements: fuel, oxygen, and heat. these basic components have been recognized in the comprehensive study of the science of fire. A fire itself is the result of a chemical reaction known as combustion, where fuel and oxygen react with one another and atoms rearrange themselves irreversibly. For this to occur, fuel must reach its ignition temperature, and combustion will continue if there is enough fuel, heat and oxygen. It's a state, process, or instance of combustion in which fuel or other material is ignited and combined with oxygen, giving off light, heat, flame. And various reaction products. Transportation systems are designed to move people, goods and services efficiently, economically and safely from one point on the earth's surface to another. Despite this broad goal, there are many environmental hazards that commonly disrupt or damage these systems at a variety of spatial and temporal scales. Whereas road curve geometry and other engineered hazards can be addressed through design hazards such as extreme weather, landslides and earthquakes are much more difficult to predict, manage and mitigate. Droughts leading to over-extraction of water, permafrost melt, increased karsts dissolution from precipitation, clay soil shrinkage, and other factors can result in ground subsidence or collapse. Impacts include potential loss of human life or injuries, building and infrastructure damage, flooding, saline intrusion to groundwater, poor drainage, and loss of agricultural land. There are three primary hazards—floods, droughts, and extreme storms. Floods affect the greatest number of people annually in terms of economic damage, floods result in the highest annual damage. In this paper, a clear survey and analysis of the three-fold means which are involved in any rescue operational processes supports and services

Keywords: Fire services, flood, hazards, protection, natural disaster.

INTRODUCTION

The economic livelihood of many individuals, firms, and nations depends on efficient transportation, and this is embodied in twentieth-century innovations like just-in-time manufacturing and overnight shipping. Transportation systems are designed to move people, goods and services efficiently, economically and safely from one point on the earth's surface to another. Despite this broad goal, there are many environmental hazards that commonly disrupt or damage these systems at a variety of spatial and temporal scales. Whereas road curve geometry and other engineered hazards can be addressed through design hazards such as extreme weather. Flooding can be classified into urban flooding, pluvial flooding (also called flash flooding), fluvial flooding (exceeding river channel capacity resulting in floodplain Inundation), water logging, and coastal flooding Droughts are "characterized by a deficiency in a region's

water supply as a result of constantly below average precipitation" over a period of time. In the past, droughts have resulted in the death of millions. Fire entails a very complex chemical process. The fire science is a branch of physical science which includes fire behavior, dynamics, and combustion. The physics of combustion determines when and where we have a fire. The diffusion flame process(fire)consists of three basic elements: fuel, oxygen, and heat. These basic components have been recognized in the comprehensive study of the science of fire. A fire itself is the result of a chemical reaction known as combustion, where fuel and oxygen react with one another and atoms rearrange themselves irreversibly. For this to occur, fuel must reach its ignition temperature, and combustion will continue if there is enough fuel, heat and oxygen. It's a state, process, or instance of combustion in which fuel or other material is ignited and combined with oxygen, giving off light, heat, flame. And various reaction products. This work is purposely set out in order to study majorly the basic dynamics and processes leading generally to disaster outbreaks, prescribe preventive measures and creating necessary awareness on how to curtail the occurrence as much as possible.

DISASTERS IN TRANSPORTATION SYSTEMS

Landslides and earthquakes are much more difficult to predict, manage and mitigate. These adverse events can dramatically reduce network serviceability, increase costs, and decrease safety. As the movement of people, goods, and services increases at all scales due to population growth, technological innovation, and globalization, the systematic study of these events becomes increasingly important. Transportation systems also create hazards. Accelerated movement comes with risks, and the corresponding accidents that occur disrupt lives and transportation systems daily. (See [47]) An accident is something which happens without planning. However, most people think of accidents in terms of physical injury, death, or at least property damage. Behind the data lies untold human suffering. This is the too costly way to learn. An "accident" is an unplanned, undesired event which may or may not result in injury or property damage, that interferes with the completion of an assigned task. A "near miss" is a form of an accident that does not result in injury or property damage. While much effort and time is expended on accident investigation, this information tells us that we should be focusing on accident prevention. The majority of accidents are near-miss and may never be reported. The causes of accidents can be broken down into two basic components, unsafe conditions and unsafe acts. Unsafe conditions are hazardous conditions or circumstances that could lead directly to an accident. An unsafe act occurs when a worker ignores or is not aware of a standard operating procedure or safe work practice designed to protect the worker and prevent accidents. Accident prevention involves the identification and elimination of causes before an accident occurs. Accident reaction is what most supervisors practice, that is, investigating the accident to determine the causes and then implementing corrective actions to avoid reoccurrence. This helps eliminate future accidents from a specific cause, but does nothing to address avoiding the accident that just occurred. One tool commonly used in accident investigations is to reenact the accident. This can provide insight as to the conditions faced by personnel during the accidents and what options were available for response. The reenactment must be done under strict controls to ensure that no one is injured during the reenactment. (Please, see [46]). Accidents as an unplanned and unexpected occurrence, which upsets a planned sequence of work; are resulting in loss of production, injury to personnel, damage to plant and equipment and eventually interrupting production flow. Control measures as an act of limiting or making something happen in a particular way, stop something from spreading, going out of hand, or getting worse. An accident is something which happens without planning. However, most people think of accidents in terms of physical injury, death, or at least property damage. Every year, accidents claim the

lives of thousands of children and many thousands more are injured. These are facts and figures. Many people believe that "accidents happen". They believe that the occurrence of an accident is inevitable and cannot be avoided. Some say "it was just bad luck" or "they were in the wrong place at the wrong time". All of these excuses fail to identify the true causes of accidents. One researcher found that for every serious or disabling injury, there are: ten minor injuries thirty property damage incidents six hundred near-miss accidents

WATER

There are three primary hazards-floods, droughts, and extreme storms. Floods affect the greatest number of people annually in terms of economic damage, floods result in the highest annual damage. Improvements in transportation, communications, and response time now mostly limit damage from droughts to economic losses, although the loss of urban water supply presents problems which are increasingly difficult to manage through transport mechanisms with increasing scale. Extreme storms include cyclones, hurricanes, hailstorms, snowstorms, dust storms, or coastal storm surges. Dust storms are the result of sustained high winds at low levels and a thermally unstable atmospheric stratification lifting dry soil or sand to heights over a kilometer. These are ecologically sensitive areas with low precipitation and little vegetation cover. Dust storms are observed with a frequency between one and twenty days per year in dry regions. Landslides and avalanches can be initiated by storms, precipitation, melting permafrost, or glacial melt. Desertification in steep areas, often due to overgrazing or previous agricultural conversion, and increases in rainfall intensity are also linked with increased number of landslides. Higher population density and development of mountainous terrain is increasing the risk from landslide hazards. Geographically, landslide events are mainly distributed where the main landslide-inducing factors include rainfall, earthquake, and flood. Droughts leading to over-extraction of water, permafrost melt, increased karts dissolution from precipitation, clay soil shrinkage, and other factors can result in ground subsidence or collapse. Impacts include potential loss of human life or injuries, building and infrastructure damage, flooding, saline intrusion to groundwater, poor drainage, and loss of agricultural land. The river basin flood control plans have several limitations, including a heavy reliance on structural flood control measures, lack of watershed management provisions, exclusion of the management of tributaries and areas subject to water logging, and insufficient stakeholder involvement. The plans generally do not sufficiently incorporate other land use or sector plans and are often based on an analysis of limited management options. Risk management is a proactive approach and is focused on the design of measures in advance of a drought that are intended to be put in place to prevent or mitigate the level of risk exposure and hence vulnerability to impacts. This approach seeks to build resilience in the systems to cope better in the future through structural and nonstructural measures on an ongoing basis. Disaster management is a reactive approach based on the implementation of measures and actions after a drought disaster is recognized. This approach applies to emergency situations and is likely to produce inefficient technical and economic solutions since actions are taken under stress without the time to adequately evaluate options. This tends support dependence on emergency relief measures rather than resilience. The figure below outlines the difference between a reactive and proactive approach for drought management. The proactive approach is more complicated but supports a longer-term outcome compared to the reactive approach. It leads to improved (Please, see [39 - 41]). From 2001 to 2018, there were nearly 300 droughts, where over 21,000 people died, and over 1.3 billion people were directly affected. Overall, Asia and Africa are the regions most affected by both floods and droughts. From 2001 to 2018, droughts occurred most often in Africa (about 120 times), followed by Asia (more than 60 times). However, more than a billion people were affected by droughts in Asia, compared to 200 million in Africa. Similar to flood occurrence,

this contrast may be due to a higher population density in affected areas in Asia. The top countries with the highest number of recorded droughts were China and the United States, (see [44,45]).

FIRE SERVICES

Fire is a complex chemical process, and fire investigators must understand the basic chemistry and physics involved to enable them to formulate opinions based on these scientific principles rather than on "old fire investigators' tales." Not being able to explain the technical aspects of fire behavior may prevent an investigator being able to accurately analyze the cause, origin, and progress of a fire. The diffusion flame process (fire) consists of three basic elements: fuel, oxygen, and heat. These basic components have been recognized in the science of fire protection for over 100 years. The diffusion flame process is defined by Richard Tuve in the *Principles of Fire Protection Chemistry* as "a rapid self-sustaining oxidation process accompanied by the evolution of heat and light of varying intensities."(see [11])

Combustion is any process in which a substance reacts with oxygen to produce a significant rise in temperature and the emission of light. For a fire to start it needs a source of ignition, a source of fuel and a source of oxygen. For example, if a smoker falls asleep with a cigarette still lit, and sets fire to the sofa, the cigarette is the source of ignition, the material on the sofa is the source of fuel and the air is the source of oxygen. Unchecked, this fire will spread quickly. (See [36]) To prevent fire, sources of ignition, fuel and oxygen need to be kept apart as much as possible. Obviously, this is difficult for oxygen, as it is in the air all around us, but it's important to always think carefully about what possible sources of ignition are in your building, as well as thinking about what will allow a fire to spread once it has been ignited. A muster point is a designated place or an area where all employees, guests or visitors to the work site, or a large crowd can assemble in case of an emergency. The muster point ensures that everyone knows where to gather even in the panic of an emergency. A meeting point, meeting place, or assembly point is a geographically defined place where people meet. Such a meeting point is often a landmark that has become popular and is a convenient place for both tourists and citizens to meet. A muster point is a safe, geographically defined place where people (i.e., the workforce and visitors) converge in the event of an emergency to receive information, instruction, and also for head count before rescue operations is initiated if necessary. A muster point is a safe, geographically defined place where people (i.e., the workforce and visitors) converge in the event of an emergency to receive information, instruction, and also for head count before rescue operations is initiated if necessary. It can also be called EMERGENCY ASSEMBLY POINT (EAP) or simply ASSEMBLY POINT. The assembly or muster point is often a landmark and all personnel at offices and work sites are aware of and instructed, trained and informed to go straight to, in an emergency situation. It is considered as the safest place of the job premises. It is an essential safety measure for any work site and must be well marked and easily found at both night and day time. Specific safety signs should point the way and mark the location as MUSTER POINT OR ASSEMBLY POINT. Emergency drill is always carried out to determine the workability of the company's emergency and evacuation plan. Muster point must be close enough that everyone can access and gather there quickly during an emergency but it should be still far enough from the work site so that those who gather are safe from the risks posed by the emergency. It should be placed in opposite direction to the wind movement so that in the event of fire, the point is still safe since fire grows with the wind. Muster point enables supervisors and other designated personnel to identify any missing employee or visitor who may still be at the work site after the evacuation. The information is thus passed to the rescuers or emergency respondents. Kindly note that muster point Should Not be attached to the building of the workplace. The U.S. Fire Administration (USFA) sponsors

research and conducts studies to support emergency responder health and safety and help fire departments prepare for and respond to fire, natural disasters, non-fire emergencies, and other threats and vulnerabilities.

Natural Disasters and Non-Fire Emergencies

The public relies on first responders during emergencies, and the more substantial the incident or the disaster, the greater the need for assistance delivered by the fire department and others with public safety missions.

Vehicle and Roadway Safety

Approximately 25 percent of on-duty firefighter fatalities occur each year while responding to or returning from incidents, with the majority of fatalities resulting from vehicle crashes. Vehicle collision is the second leading cause of firefighter fatalities.

Assembly Points:

The assembly points can be defined as a location for gathering. Such is known to be identified across the workplace. Mostly, they are being designated by the department or area of a facility. The purpose of the assembly point is simply to serve as a location through which information updates are given from emergency responders. It is natural to provide access to washroom facilities and other protection measures from the elements. The six elements of the life cycle of fire are described by Dawson Powell in The Mechanics of Fire. These elements are input heat, fuel, oxygen, proportioning, mixing, and ignition continuity. All of these elements are essential for both the initiation and continuation of the diffusion flame combustion process. The first three elements--input heat, fuel, and oxygen—are represented by the fire triangle. The combustion reaction can be depicted more accurately by a four-sided solid geometric form called a tetrahedron. The four sides represent heat, fuel, oxygen, and uninhibited chain reactions.

Table 1: Fatal Fires by the Number of Deaths Per Fire, Lagos 2009 - 2014.

Number killed in fire	2009	2010	2011	2012	2013	2014	Total number of fires	Proportion of fatal fire
1	95	95	102	116	103	193	704	93.7%
2	1	2	10	8	13	4	38	5.11%
3	--	2	1	2	1	-	6	0.8%
4	-	-	1	-	-	-	1	0.13%
5	1	-	-	-	-	-	1	0.13%
6	1	-	-	-	-	-	1	0.13%
Total number of fires	98	99	114	126	117	197	751	100%

Source: Lagos State Fire Safety Services. (See [14])

SUMMARY

Generally, the disasters which are being influenced by many factors that affect growth, spread, and developments. The physical shape and state of the fuel, the available oxygen, and the transmission of heat all play vital roles in fire development. While each fire is different, all fires follow certain predictable patterns which, when understood by the investigator, provide a scientific basis for determination of origin and cause. Floods affect the greatest number of people annually in terms of economic damage, floods result in the highest annual damage. Accidents happen without planning. However, most people think of accidents in terms of physical injury,

death, or at least property damage. Behind the data lies untold human suffering. This is the too costly way to learn.

CONCLUSION

Indeed, it's very clear without any iota of doubt that disasters have greatly a significant economic importance which cannot be underestimated.

RECOMMENDATION

From the information so far, it can be deduced that the disasters (such as fire) seem as being uncontrollable with time. This could be generally believed to be caused due to lack of proper information and necessary awareness. Hence, there supposed to be a proper as well as regular creation of awareness.

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