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WATER AND DISASTERS

(Past Secretary)

Introduction

In recent decades, people throughout the world have become increasingly alarmed over extreme weather events which seem to be growing in frequency and adverse impact. Water related hazards are cyclones, storm surges, floods, drought, avalanches, landslides or mudflows and the tsunamis which hit Indian sub continent in 2004 which was not known to our people. Poor communities are particularly vulnerable to these risks. It is now recognised that reducing this risk is a vital step towards sustainable development.

Of course we can't yet control the forces of nature. But we can try to reduce the enormous risk of damages due to a natural hazard. Since the natural phenomena will continue to occur the problems they present have to be faced through prevention, mitigation and management. Prevention is essential from identifying the natural hazards and assessing threats to life and property to adopting measures to reduce those threats and making the right decisions on land-use planning and design. For eg: good building codes and standards for development activities in areas prone to natural disasters can hugely reduce vulnerability and thereby risk. Disaster prevention measures are complex. They relate not merely to the disasters themselves but also reflect the interaction between development and the environment on the one hand and between social and economic interests on the other. Mitigation measures are key in lessening the impact of a disaster. Community awareness campaigns, instruction in how to deal with disasters - dam construction to lessen the impact of flooding - all can cut both the human and financial cost.

Forecast and early warnings based on scientific monitoring of meteorological and hydrological hazards are a pre-requisite for any disaster preparedness, planning. The inter relation and coordination between the various institutions involved in early warning, dissemination of information and disaster response is important. The outreach and effectiveness of the early warnings determines the success of disaster response mechanism.

Underlying all these measures must be a strong knowledge base and a clear understanding of how and why natural hazards happen and how they can escalate into disasters. Systematic studies of meteorological phenomena and observation related to cyclones, severe storms, floods, landslides, mudflows, tsunamis and their impact on human activities are to be carried out. Knowing how strong winds can effect the stability of a structure, how building a railway line on a natural drainage system will effect flooding in the area and how urbanization might alter downstream river discharges, are all crucial pieces in vulnerability assessment. Authoritative information is at the core of prevention and is vital for its success. Timely warnings and action ensure preparedness and empowerment of society, the nation and humanity to address water related hazards.

To reduce the risk due to water related disasters, the watchword is to "be informed and be prepared". Information must flow between global and local, between traditional and modern, between village and the board room, between scientists and decision makers.

FEW EXAMPLES OF WATER RELATED DISASTERS.

1. Tropical Cyclones:

Tropical Cyclones are the most devastating of all natural hazards. Tropical cyclones are areas of low atmospheric pressure that form over warm tropical or sub tropical waters, eventually building up into a huge, circulating mass of wind and thunderstorm up to hundreds of kilometers in diameter. Surface winds can reach speeds of 200 km/hr with the "eye" at the centre, just a few dozen kilometers in diameter, is relatively calm. Cyclones are known by different generic names depending on where they form. Eg. Typhoon in western pacific, hurricane in North Atlantic & Carribean, Tropical Cyclones in Indian Ocean and SW pacific region. The cyclone can cause disasters up to hundreds of kilometers inland with heavy rain falls causing floods. Satellites, Weather radars and computers are now making short work of monitoring tropical cyclones around the globe from the early stages of their information. The WMO has set up one station at New Delhi also.

2. Storm Surges:

This is a bye-product of Tropical Cyclones. The "walls of water reach land from the sea with immense force and wash away everything in their path, such one example is the one which hit coastal wet lands of Bangladesh in 1970 leaving 3 lakh people dead. A storm surge is formed when a tropical cyclone move over a continental shelf. A combination of strong onshore winds and low atmospheric pressure creates the surge.

3. Tsunamis:

The huge fast moving waves known as tsunamis are quite different from storm surges except in their capacity to destroy. Generated by earthquakes, Volcanic eruption or shifts in the sea bottom, these waves travel faster than 1000 km/hr on the open sea, but are so long they are barely noticeable. When they reach coastline, however, contact with the sea floor builds them up to tremendous heights. Tsunamis are usually seen in Pacific Ocean.

4. Floods :

Flooding happens when rainwater or snowmelt accumulates faster than soils can absorb it or rivers carry it away. Floods come in all sorts of forms, from small flash floods to sheets of water covering huge areas of land. Dam breaks can also cause catastrophic flooding. An EL NINO phenomenon in the pacific, storm surges in coastal areas caused by cyclones, Tsunamis, can cause flooding. An inter disciplinary approach to understanding floods is therefore essential as they rise from so many different causes. Floods can threaten human life and property but they also replenish wetlands and flood plains have immense developing potential as it refertilizes the fields. An Integrated Water Resources Management Plan for River basins will be an additional help in the mitigation of floods.

5. Landslides and Mud Floods:

Landslides happen when heavy rain or rapid snowmelt sends large amounts of earth, rock, sand or mud flowing swiftly down mountain slopes, especially if bare or burnt by forest. The most common culprit is water seepage. Mudflows and the coarser debris flows are essentially wet, fast moving landslides that form when masses of loose, wet debris become unstable due to saturation from rainfall. The result is a flowing river of mud or slurry. Hazard maps are one of the first steps towards formulating such management strategies. House holders can plant ground cover on slopes and build retaining walls in mud flow areas.

6. Avalanches:

An avalanche is a large mass of snow and ice that moves rapidly down the steeper slopes of mountains or Hills at speeds of up to hundreds of kilometers / hr. This is caused in mountainous terrain during winter and spring. Natural and recreational types are there.

7. Drought :

Drought is a creeping phenomenon. Drought stands alone among water related disasters. It is caused by too little water, not too much. It takes place over a relatively long time. Drought is actually a normal, periodic feature of climate, the result of a natural reduction in precipitation over time. Different systems of drought are Hydrological, Meteorological, Agricultural and socio economic droughts are there. Drought can endanger public safety, health and quality of life. Early warning systems can reduce impacts by providing necessary information. Soil moisture can be tracked through remote sensing technique.

8. Industrial hazards and water :

Chemicals are a mainstay of industry whether they are used in the production process or emerge as end products themselves. But many are highly toxic and can cause serious or even catastrophic pollution problems, if they end up in water courses or taken as a result of industrial accident or continuous discharges. Strong legal frame work governing safety is necessary.

Management Strategy

In most of the cases natural disasters are unpredictable like the devastating earthquake of Gujarat in 2001 and the so called Tsunamis of December 2004. But the tragedy is that we tend to become wiser only after a devastation of great magnitude takes place. The level of disaster preparedness is a major factor in mitigation of natural disasters. Nowadays many of the disaster are man made due to indiscriminate human activities on environment. A comprehensive disaster management system comprises of suggestive strategies, recommendations and action plans, mitigation, prevention and preparedness. Effective early warning systems and prompt dissemination of the relevant information and relief play an important role in minimisation of damage due to disasters. Effective and efficient observation and monitoring systems are to be installed especially in areas of scarce data in order to have a reliable feed back information. Engineers have been in the forefront of disaster mitigation programmes. Usage of suitable and appropriate design standards. Use space technologies like remote sensing satellite communication and Global positioning systems, Radars etc. As Engineers, we are responsible to the society at large as we are the builders of Nation. But an integrated approach involving Engineers, Architects, builders and sociologists need to work together now for improved result.

Creation of a "Safety Culture" demands involvement of local communities so that information and experience is shared through all forms of modern communication means, education and professional training. As a result communication will be able to be informed and be prepared. Our readiness to face natural disasters is inadequate. We need Training for that. Engineering profession is directly associated with the well being of the people. We will have to re-establish our self esteem and professional integrity to achieve the millennium Development Goals.

Conclusion

Every day hundreds of natural water-related hazards loom over the world. A cyclone may be stirring near west while the tentative signs of a severe drought may be seen in the east. Avalanches may be ready to go in one mountain and mud slides to pour down in the hills of other countries. All these hazards are potential disasters for the unprepared common man. The trend in economic impact due to water related disasters is increasing now. The impact of this is most severe and tragic in the least developed and developing countries and has set back their development goals by decades. It is read in a recent international report on climate change, that climate change and a warmer world will result in more natural disaster. At the same time it should n' t be forgotten that mankind has always lived with climate shifts and survived them. If people are properly informed at all stages of disaster management cycle and in language they fully understand, they will be less vulnerable and better able to participate effectively in any mitigation measures. Early warnings that quickly reach those at risk and that are effectively acted upon are essential elements of disaster reduction strategies and action plans at all levels. National Hydrological and meteorological services all over the world play a crucial role in providing vital information on the vulnerability of society to water-related disasters and provide early warning of impending disasters. Water -related disasters are a consequence of the interaction of extreme hydro meteorological events and vulnerable human economic activities.

Every State has constituted their Disaster Management Authorities and the NDRF is doing their wonderful hectic rescue activities in every disasters. The recent water related disasters of Uttarakhand and Assam floods are a few examples. Also the NDRF rescue operations in the devastating Chennai floods of November 2015 were laudable. As per the latest report NDRF has rescued 51000 victims from disasters during 2015. Kerala State Disaster Management Authority was formed in 2007 as stipulated in the National Disaster Management Act 2005 with Chief Minister as the Chair Person with 10 members. Flood disaster susceptibility study maps are being prepared for TVM, KLM, KOCHI, TSR AND KZD by them with the help of satellite images and GPS. Let us hope for the best and be prepared for the worst.

Jai Hind

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