Environmental Science
Lecture 22

Best from Waste

The best way we can actually derive a management for solid waste is to create something useful possible from that waste. The concept of best from waste came into being and the concept of laying a plastic road was one of the best options that came up from reusing plastics because in today's world, one of the new materials that have emerged is the use of plastics which has pretty much become unavoidable. Be it plastic bottles, bags, covers, innumerable kinds of packaging materials, disposable materials, its all forms of plastic and styrofoam which necessarily cannot be recycled in a 100% pure form. The next best way is to actually go about laying a road. It is found with increase in global population and the rising demand for food and other essentials, there has been a rise in the amount of waste that has been generated everyday by each household. You can count the number of households that are increasing in each city and that pretty much gets multiplied by hundreds of thousands or lakhs. Waste that is not properly managed especially excreta and other liquid and solid waste from households and community can cause a serious health hazard and a lethal spread of various infectious diseases.

Role of an Individual to Prevent Pollution

Who introduced these contaminants into the natural environment? Answer is very obvious, it is us humans. To find a solution also, rests with us. This could simply lead to the end of everything in the sense, we might be responsible for all these effects but the damage is not only felt by humans in the long run, but by plant life, other ecological life which is eventually going to harm us in the longer run. If there is a problem, there must obviously be a solution. For pollution there are various solutions but how feasible are these solutions, how well can these solutions be maintained in terms of how frequently human beings follow them or how frequently will we break the rules. These solutions are just not in paper format for us to read but it has to come to a phase where we are going to incorporate it in our day to day lives.

Prevention is obviously better than cure. To essentially win the race against pollution, all of us have a role to play. It is very easy to question "what can I do, if I am going to make a change, how does it matter?". But when it's an entire community we are talking about, an entire society we are talking about, so many eyes do make a difference. It is only when we behave in a certain way, our children will also learn to behave like that. When we stop littering our roads and public environment, will they learn that littering is wrong? If we heal the Earth, we automatically ensure that we heal ourselves and we are also ensuring that our progeny, our children and their children will continue to lead a very healthy life.

As an individual what is our contribution? Stop smoking or at least follow the no smoking sign. Where smoking is not permitted, we have to strictly follow it. Use unleaded gasoline in all your cars, keep your car properly maintained to keep it in good running condition to avoid smoke emissions. Share a ride or engage in carpooling. Instead of using your car's, choose to walk or ride a bicycle, with this eco friendly practice, you will also be healthier and happier by staying fit. Never use open fires to dispose of wastes. Adopt the 3Rs of solid waste management; reduce consumption, reuse whenever possible and recycle whenever possible. Inorganic materials such as metals, glass and plastic; also organic materials like paper, can be reclaimed and recycled.

Start composting brown leaves in your yard and green scraps from your kitchen. Any wet waste from the kitchen can be added to the compost. This will not only reduce the waste in the landfill but it will also help in improving soil conditions, home gardens as well as the quality of the garden right outside your house. Reconnect with nature, live green by using green power supplied abundantly and freely by the wind and the run. Hang your laundry to dry to minimize the use of gas or electricity from your dryers. Enjoy fresh air from open windows to lesen the use of air conditioning systems. Say a very big no to GMOs of genetically modified organisms especially for farmers where they have to choose seeds or seedlings. Genetically engineered crops are not only bad for the environment since they require massive amount of fungicides, pesticides and herbicides, but GMO altered foods are also of health risks and can negatively impact a farmer's livelihood. Use eco friendly or biodegradable materials instead of plastic which are made of highly toxic substances injurious to our health.

Create your own green space; Value your garden. It doesn't have to be an independent bungalow for you to value your garden. Even if it is a small balcony, having a few pots does help in keeping the air fresh in your own homes. You need to plant more trees, make sure there are indoor plants in your homes, they clean the air, provide oxygen and also beautify your surroundings. Thus, care for them and protect them, especially the big trees around in the forests. We not only protect ourselves or our immediate families but the families to come in the future generations as well. Industries should fuel with lower sulphur content. Industries should monitor their air emissions regularly and take measures to ensure compliance with the prescribed emission standards. Install gobar gas or bio gas plants in areas of high availability of cow dung, especially in rural areas. They can be a good substitute for cooking gas and electricity. "One person alone cannot save the planet's biodiversity, but each individual's effort to encourage nature's wealth must not be underestimated" - this is one of the goals of United Nations Environmental Programme.

Disaster Management

Anything that causes disruption could be induced, a situation after severe transformation of ecological response. This consists of the different aspects of disaster management that we will be discussing. What is disaster? 'An event that is either natural or manmade, sudden or progressive, which impacts with such severity that the community has to respond taking exceptional measures". It is a phenomenon involving extensive ecological disruption leading risk to life, property and health to an extent warranting extraordinary response from outside the affected area. Enormous population pressures and urbanization. A flood, a drought or an earthquake millions of people are affected each time a disaster occurs depending on the frequency of the disaster, the concentration of disaster, the area it has attacked as well as the frequency it comes in. Is it going to happen frequently? Is it going to be a very concentrated episode of higher magnitude; all of these are important factors. Large-scale displacement and the loss of life, loss of property and agricultural crops.

The reasons for these are varied, you have increasing population pressure in the urban areas. There is an increase in the encroachment into lands; river beds or drainage courses, low lying areas etc. poor or ignored zoning laws and policies. Lack of proper risk management or insurance.

Major disasters in India - It's a highly disaster prone country, eight natural calamities per year is a frequency. 5 fold increase in the frequency of disasters in the last 3 decades. Bhopal Gas tragedy, cyclones that frequent Andhra Pradesh and Orissa. Earthquake in Uttarkashi in 1990, Latur in 1993, Gujarat in 2001 and Sikkim in 2011. Tsunami in 2004, Train accidents and bomb blasts in Delhi and Mumbai.

India's vulnerability to disasters - 575 of the land is vulnerable to earthquakes. Of these, 12% is vulnerable to severe earthquakes. 68% land is vulnerable to drought. 12% is vulnerable to floods, 8% of the land is vulnerable to cyclones. Apart from natural disasters, some cities in India are also vulnerable to chemical and industrial disasters and manmade disasters.

If you look at the different types of disasters, you have natural as well as man-made. Under natural, you have cyclones, floods, earthquakes, volcanic eruption, epidemics and Tsunamis. Man-made you had air crashes, sinking ships, train accidents, building collapse, bridge collapse, bomb blasts, warfare. But certain percentage of natural disasters could be an after effect of some man made or human induced activity. For instance, the landslide could be due to constant soil erosion, constant deforestation in a particular area because of human intervention. Even though the final product of a landslide is a natural calamity or a natural disaster, it is eventually caused by human beings.

Factors affecting disaster - the host factors are; age, immunization status, degree of mobility and emotional stability. Environmental factors are Physical factors, Chemical factors, Biological factors, Social factors and Psychological factors. Characteristics of Disasters - Predictability, controllability, speed of onset, length of forewarning, duration of impact, Scope and intensity of impact. If you look at the disaster cycle; first you have the impact- what is the main impact that is felt. The immediate response that is felt or the response received from the people around the area of disaster, Recovery, final outcome when everything and everyone settle down and you begin to see what has everything come down to in terms of property, life and landscape. Then comes to create Prevention measures. What shall we do to prevent this from happening the second time and if it cannot be prevented i.e it cannot be looked forward to or it cannot be predicted, how can the impact be reduced to a certain extent and how can we prepare ourselves and the general public so that the next time when the impact is felt, the response in recovery is faster and we are prepared for it such that, the final outcome or the damage that is seen, is minimal.

Phases of Disaster Management - Disaster Preparedness, Disaster impact, Disaster response, Rehabilitation and Disaster mitigation. If you look at the Phases of Disaster - you have the pre disaster which needn't always be there, it is only now that with technology that you have certain pre disaster timings or you have the weather board coming and informing us that there is a threat for flood, there is a threat for heavy rains or a Tsunami could be warned. The Pre disaster is very rare, then you have the dip to the final impact. Then use the fast recovery speed which is the Honeymoon phase or the community cohesion where everything is going well because the immediate thing is to help human beings. It is the heroic phase where the main aim is to serve everyone and everything. Then there is plumbing disillusionment in terms of as things are settling into place, we finally look around us and see, what is the loss that is felt around us, what is the loss within our homes, within communities, within building societies, within the built landscapes, built environment, etc. Then, there is a steady growth process, there are certain trigger events and Anniversary reactions. This taken 1 to 3 years This immediate thing could happen with a week span, three to four days is what we are talking about from the day of impact to the immediate recovery phase. But then you come up with a long term pattern on ensuring that people get resettled. All of that could take anywhere from 1 to 3 years and that is the beginning of construction or a new beginning depending on the magnitude of the disaster and the frequency of the disaster.

If you look at the disaster management here, you have pre hospital. Initial phase could be planning if you look at it. But let's say you are not at all aware of it and this is the first disaster that is hitting. Pre hospital will be first, then the hospital, then they come off the hospital that's their second home or second base camp of sorts. How do we plan and ensure that hospitals are

going to be equipped for such disasters. Are doctors and nursing communities going to be equipped for such disasters? This planning and pre hospital could be based on which number of disaster is this. If this is the first time its attacking, we are not going to have a planning involved. Its better to have a plan in place. Disaster management plan must be available for all cities, irrespective of the fact that they have faced the disaster or not because when we have a plan of action in our hand, the reaction time is much faster and swifter as well.

If you look at the planning phase of Disaster Management, it is Prediction, Prevention and Preparing the public. If you look at the operation phase of it, it is; Rescue, Relief and Rehabilitation. First our aim should be to predict with the current trends in growth of science and technology, how possible is it, to predict any number of the disasters we have? Man-made disasters are slightly more difficult to predict but they can be avoided. Say for instance, we are just careful. If we ensure all the engines of flights, trains, cars, public transport buses; are checked. All of these are in the predict and prevent action. Be it man-made or natural disasters. When we say natural disasters are predictable, we refer to certain amounts of evacuation plan can be in place. The damage of things and landscapes sometimes cannot be avoided but at least loss of life, of animals and human beings, can be reduced or minimized. In the prevent section, it is very crucial that we ensure that man made disasters are something that we look out for and finally how do we go about preparing ourselves, preparing the community at large and the rescue mission services. How do we ensure to prepare them such that their reaction time is swift and they can solve all the issues that come into hand when the impact is felt right away and graciously.

Principles of Disaster Management

Disaster management is a responsibility of all spheres of the government. Disaster management should use resources that exist for a day-to-day purpose. Organizations should function as an extension of their core business. Individuals are responsible for their own safety. Disaster management planning should focus on large-scale events. DM planning should recognize the difference between incidents and disasters. DM planning must take into account of the type of physical environment and the structure of the population that exists in that particular area. DM arrangements must recognise the involvement and potential role of non-government agencies.

Under the 'prediction' factor, what are the steps that can be taken? Measures for efficient forecasting and warning systems, Developing GIS for early detection and warning, Information technology for effective communication network. Pro-active measures for disaster preparedness and mitigation - administrative, financial, legislative and techno-legal. Developing public awareness to build up society's strength to face disasters. National networking for

immediate medical response. Emphasis on risk education, mitigation and awareness, while strengthening the response.

The steps towards prevention - we need to evoke certain existing systems of response mechanisms in the wake of any natural or manmade disaster at all levels of the government and steps to minimize the response time to effective communication and make sure the measures to ensure adequacy of relief operation throughout irrespective social backgrounds or economic backgrounds. Develop strategies for inclosure of disaster reduction, components in on going plan or non-plan schemes. Prepare the community to face the challenge and respond in case of impending disaster. Lay stress on preparedness including prevention, mitigation of chemical industrial disasters while strengthening their emergency response. Stay up to date with the latest international best practices and recent developments within the country. Highlight the salient gaps evaluated based upon the critical review of the present states for future action. Rehabilitation involves providing temporary shelters with minimal hygiene sanitation to the affected, restoring 'normalcy' through ensuring resumption of family's daily living patterns. Psychological impact of chemical disaster manifested as PTSD or Post traumatic stress disorders in displaced people due to disaster needs care by a psychologist and psychiatrist. In post-disaster scenarios some of the casualties develop sequel due to chemical or radiation injuries. These cases may need regular follow up, medical care, reconstructive surgery and rehabilitation. Close monitoring is required to see any long term health effect like blindnes, interstitial lung fibrosis and neurological deficiencies, etc. and need to be treated as well and recorded to ensure we prepared for such events in the future as well.

Disaster Response - Epidemiologic surveillance and disease control, Vaccination and Nutrition. Rehabilitation Phase, we need to ensure it does not affect; Water supply, food safety, basic sanitation and personal hygiene and vector control. Disaster effects are typically; death, disability, Increase in communicable diseases, Psychological problems, Food shortage, socioeconomic losses, shortage of drugs and medical supplies, environmental disruption. The disaster recovery phase is ensured by; Successful recovery preparation, we need to be vigilant in health teaching, Psychological support, Referrals to hospital as needed, Remain alert for environmental health and nurses must be attentive to the danger and they must keep a checklist on a list of symptoms that must looked for.

The main areas of concern; Activating an early warning system network at its close monitoring, mechanisms for integrating the scientific, technological and administrative agencies for effective disaster management. Terrestrial communication links which collapse in the event of a rapid onset disaster. Vulnerability of critical infrastructures (power supply, communication, water supply, transport, etc) and ensuring such facilities reach disaster events.

Funding - primary relief has to be every important, that is the first disaster response. Preparedness and mitigation is very often ignored. Lack of integrated efforts to correct and compiled data. Information and local knowledge on disaster history and traditional response patterns. Need for standardized efforts in compiling and interpreting geo-spatial data, satellite imagery and early warning signals. Work areas continue to be forecasting, modeling, risk prediction, simulation and scenario analysis etc. Absence of a national level, state level and district level directory of experts and inventory of resources. Absence of a national disaster management plan and state level and district level disaster management plan. Sustainability of efforts. Effective Inter Agency Coordination and Standard operating procedures for stakeholder groups, especially critical first responder agencies. Emergency medicine, critical care medicine, triage, first aid.

Nodal agencies for Disaster management - for the floods, we have Ministry of Water Resources, CWC. For cyclones, we have the Indian Meteorological Department, Earthquakes: Indian Meteorological Department, Epidemics : Ministry of Health and Family Welfare, Avian Flu: Ministry of health and Ministry of Environment. Ministry of agriculture as well as Animal husbandry. All of these agencies have to be in contact with each other because of these disasters could be an after effect of the previous disaster itself. For instance, soon after floods because of stagnant water everywhere, there could be a source of creation of mosquitoes as well as other epidemic related issues. Then the Ministry of Health as well as the MInistry of water resources, have to have a coordinated combined effort to ensure good satisfactory relief. For other chemical disasters, we have the Ministry of Environment and Forests; Industrial disasters we have Ministry of Labour, Rail accidents - Ministry of Railways, Air accidents - Civil aviation. Fire - Home affairs. Nuclear incidents belongs to Department of Atomic energy and mine disasters fall under the Department of Mines.

New directions for disaster management in India - The National disaster management Authority (NDMA) has been set up as the apex body for Disaster Management in India with the Prime Minister as its Chairman. Disaster management Authorities will be set up at the state and district levels to be headed by the Chief ministers and collectors / Zilla Parishad Chairman respectively. A National Disaster Mitigation fund will be administered by NDMA, states and districts will administer mitigation funds. A National Disaster Response fund will be administered by NDMA through the National Executive Committee. States and Districts will administer state disaster response fund and Disaster Response Fund respectively. 8 Battalions of National Disaster Response Force (NDRF) are being trained and deployed with CSSR and MFR equipments and tools in eight strategic locations. A National Disaster Management Policy and National Disaster Response Plan will also be drawn-up.