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Point for discussion this month **Earthquake induced disasters**

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Eternal Words

We cannot command Nature except by obeying her.

~Francis Bacon

This is a beautiful planet and not at all fragile. Earth can withstand significant volcanic eruptions, tectonic cataclysms, and ice ages. But this canny, intelligent, prolific, and extremely self-centered human creature had proven himself capable of more destruction of life than Mother Nature herself.... We've got to be stopped.

~Michael L. Fischer, Harper's, July 1990

Dear Readers,

The beautiful, calm and quiet sea you see in the cover photo is of Harihareshwar – a scenic place on the west coast of India near Mumbai. It is very serene and soothing place which consoles your mind and body and treads the path to integrate with nature. There you connect with the sea and your mind sways on the waves coming to touch you!

Huge airports, aeroplanes, industries, infrastructures built in decades with enormous investments years together can be converted into debris in a fraction of minute when they are hit by earthquake. If it is coincided with other calamity like tsunami, then the destruction touches its extremities. While seeing the live updates of Japan earthquake followed by Tsunami on different news channels on 11th March, 2011, I thought it's like a children's game - notorious child destroys the creations and efforts of other child with a single blow within a second.

We express our deep condolence to those who lost their lives. Mighty nature can ravage human creations at any moment and show that nothing is surmountable by humane technologies and economy. Nature has created little intelligent animal – human – with experimentations of billions of years. She knows how to destroy her creation if it does not yield positively. That's why, man has to learn to cope with the nature's mighty forces to continue his race on this mother earth.

Dr. Rajendrasingh Sisodiya, a Magasayay Award winner known for his work of revival of rivers says that water bodies are facing encroachment and pollution problems to maximize the economy. Let's rethink our mandate given by nature, plan and cope with nature without saying "conquered the nature"! No way! Let's accept the fact man is the miniature sculpture developed by nature.

We know Japan has great strength to overcome any man made or natural disaster. Discipline, patience and hard work is in Japanese blood. So it will surely come out as a phoenix from the ashes. Our all best wishes are with the Japanese people. May God give them the strength and courage to overcome this.

Thank you,
Chief Editor

The Japan Earthquake and Tsunami Disaster 2011

The sun of 11th March, 2011 fetched darkness in Japan. Japan experienced the worst ever earthquake followed by tsunami in its history. The strongest earthquake of 9.0 magnitudes off the north-eastern coast of Japan set off a tsunami up to 30 meters high which washed up to 5 kilometres inland. It was followed by more than 300 aftershocks for days, many of them of more than magnitude 6.0.



This resulted in massive loss of life, environmental devastation and infrastructural damage. Another big damage is to the Fukushima nuclear power plant, leading to serious risks of contamination from radioactive releases into the environment.

Solid waste and disaster debris

There is a huge amount of disaster debris to be disposed off properly. It's a stupendous task of treating and disposing this waste in an environmentally apposite manner, and recycling the waste wherever possible (for example, crushing of concrete and brick to produce aggregate for road and building construction) will be critical priorities.



Add to this the problem of sorting hazardous and toxic materials that have been accidentally mixed up with ordinary debris. These may include asbestos, oil fuel, and other industrial raw materials and chemicals.

Soil and water contamination

Salination of water bodies such as rivers, wells, inland lakes, and groundwater aquifers might be a major problem that the Japanese will have to face in near future. This may affect soil fertility of agricultural lands, subsequently affecting the yields in the medium and long term. In the post - 2004 tsunami period, many water bodies were contaminated by damaged or destroyed septic tanks and toilets, with sewage infiltrating the water supply system.



Radiation resulting from damage to nuclear plants

Officials in Japan are distributing iodine tablets as a precaution as it protects against radiation-induced cancer. Many scientists and experts cautioned that the disaster could be on the scale of Chernobyl. Radiation exists for a long. It inflicts damage upon anything exposed to it. Most serious effect of radiation on the environment is damage to humans and animals. It can damage DNA leading to cancers, birth defects, and even death.



Minute traces of radiation have been noticed as far away as Southern California. Radioactive fallout can travel with the winds. This happened on a much larger scale during the 1986 nuclear disaster at the Chernobyl Nuclear Power Plant in what is now the Ukraine.

The releases of radioactivity from Chernobyl dwarfed what has so far occurred in Japan. Chernobyl's fallout traveled all over the northern hemisphere, and probably had medical consequences in several regions. So far, what has escaped the reactors in Japan is modest and the health risks are exclusively local. None of which is to say further explosions in the plant could not change things.

Lessons from disaster and solutions

Japan is a mountainous country – upland covered by forest with densely populated lowlands. They are crowded into a few sprawling urban areas. The country has had its experience of urban pollution impacts in the last 50 years, But Japan has bettered in taking care of its natural environment in recent decades than most of the countries.

Earthquakes are not new to Japan. But the scale of disaster by this earthquake is the largest one. Thousands of humans are dead and thousands are still missing. The damage to the environment is not counted yet.

Though post disaster waste management is well known issue. Damage to the costal region and ecosystem will have direct effects on occupational activities and livelihood. Siltation of the natural waterways due to tsunami will be a blockage in the costal canals.

To restore the whole thing to normalcy will require years. Major challenges are the nuclear power plant damage and the solid waste and disaster debris generated by this tsunami and earthquake.

The most obvious lesson is not to build nuclear power stations near seismically active zones, or tsunami-prone zones. In Japan that is not so easy, since the whole archipelago, to greater or lesser degree, is seismically active.

The larger significance of the disaster in Japan will be what it does to decision-making in energy investments around the world. Chernobyl had the effect of dimming enthusiasm for new reactors almost everywhere for 10 or 20 years. Eventually, the anxiety wore off, and by 2000 or 2005 more and more countries were once again building more and more reactors.

What are the control measures for radioactivity being spread because the contaminated water being disposed off in the sea? It's massive as far as marine ecosystem and coastal development is concerned. There are some ecotechnological techniques like phytoremediation evolved in due course of time after the Chernobyl to decontaminate the water from radioactivity.

Especially sunflower was tried out to extract radioactive uranium from the water. Secondly, some contaminated land near the Chernobyl was recovered using the Indian mustard plant which is known for its absorption capacity of heavy metals. There are many other plants like spinach, cauliflower etc. have ability to absorb heavy metals from the soils. Ecological biochemistry, bio-responses to radiation and geo-bio-chemical cycling of radioactivity using organic and ecosystem approaches will be helpful in minimizing the radioactive shocks like Fukushima in minimal duration.

Ahar River of Udaipur Again

In last one year after completion of green bridge installation project, there is some good news.

Green Bridge system was under water for 3 months with relentless discharge of industrial effluents. After the monsoon 2010 was over, the gates of Udaisagar Dam built in 16th century) were not opened for pretty 3- 4 months. Being under water for about 1 meter or so, the system did not develop anaerobicity.

After reduction in water level, it was noticed that the filtration capacity of in situ horizontal filters is not affected due to siltation or flash floods. Green bridge structures remained stable during high floods.

System revived after reduction in water levels – the ecological cycle followed the path it followed last year after construction of green bridges – first growth of phytoplanktons then moina – tiny animals to feed on phytoplanktons – fishes to eat moina – birds to eat fish – the food chain of riverine wetland is completed despite of industrial discharges. Finally, the crocodile inhabited near the green bridges with its two siblings. It has established that the grafting of ecosystem – starting from detritus food chain – green bridge system – can revive the self-purification capacity of the water body leading to the better water quality downstream.

