



India after Bhopal gas tragedy and other legal systems

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Abstract

Rapid industrialization in a developing country poses a serious threat to the environment and increases the risk of disasters and natural calamities. This work aims to address the issue of disaster management from the legal perspective. An attempt is made through case studies of Bhopal Gas Disaster and Fukushima Nuclear Disaster to trace the evolution of legal systems in disaster management. The impact of these disasters on existing legal systems of India as well as other countries will be studied to find out the preventive steps taken and to identify the lacunas that need to be addressed to cope up with these alarming situations. The legislations in existence before the Bhopal Tragedy are compared with the legislations proposed or enacted after the incident. The adherence to the concept of strict liability can only be achieved through implementing a global framework as such an incident has trans-national impact. This global framework has its justification in the environment impact of each man-made disaster which is not highlighted and is over shadowed by human sufferings during these disasters.

Keywords: disaster, Bhopal gas, tragedy, natural disasters, EPA, EPCRA, liability

Introduction

Unlike natural disasters that are inevitable, man-made disasters are not excused by the inability of the agencies to tackle the situation and thus carry a 'zero tolerance approach' which is the standard for disaster management. However, critical areas of concern is the human error and ineffective management of the various wings of government. Proper decisions beginning from the selection of the site, participation of the public is what is required during these circumstances. Until there is a comprehensive framework in disaster management which includes management at the local and district level, full measures cannot be achieved.

Major disasters like the Bhopal Gas Incident bring into notice the world concern as to the importance of preventing such disasters. The later realisation that the safety measures were not adopted properly can have a serious impact of the safety of the human-beings and the environmental aspects too. Technical errors or calling it process and safety system failures, sometimes deliberate, for instance, terrorist attack or sabotage needs to be taken into concern.

Rapid industrialization has increased the risk and sensitivity of the disasters that can happen and pose a threat to environment. This work aims to address the issue of disaster management from the legal perspective. An attempt is made through case studies of Bhopal Gas Disaster and Fukushima Nuclear Disaster to trace the evolution of legal systems in disaster management. The impact of each disaster on legal system of other countries will be studied to find out the whether preventive steps were taken and to identify the lacunas that need to be addressed.

1. Chemical disaster management: comparative analysis of legal systems post Bhopal

1.1 What Bhopal Disaster meant for America

The Bhopal gas tragedy shook the whole world from sleep, and America who remains blind by "development", also couldn't help but notice the disaster that unfolded on December 3, 1983. Americans woke up to headlines like "Can it happen here?" illustrated with pictures of the horror on the cover. United States (US) had never experienced a disaster as severe as Bhopal^[1]. United States Congress conducted various inquiries and investigation for the cause of disaster and probability of similar disaster in the US. The investigation was focused on both prevention through process safety in chemical industry and response plans of local communities in case of any emergency.

The federal government could not take any action on prevention front since no agency had the authority to order any facility for process change in manufacturing so as to avoid any accidental release of hazardous chemicals. But a movement grew among Labour Unions with the support of citizens, for Community Right-to-Know legislation. This movement had its origin in other toxic incidents like "Love Canal^[2]", where toxic chemical waste was released into an abandoned canal, which later became a residential area. Bhopal tragedy only acted as a catalyst in demand for legislation on responsibility of chemical producing entities towards citizens in surroundings.

This part reviews the major legislative amendments in US post Bhopal gas disaster and their effectiveness. Also, I will make comparative analysis between legal developments of India and

US in chemical disaster management so as to find the lacunas that need to be addressed before another Bhopal happens somewhere.

1.2 US Legal Regime: Before Bhopal Gas Disaster

In order to critically evaluate developments post Bhopal, let's first see laws that were present to regulate chemical disasters at the time of Bhopal incident. US established Environment Protection Agency (EPA), after 'Silent Spring', written by Rachel Carson developed environment consciousness among people^[3]. EPA was established on December 2, 1970 to consolidate in one agency a variety of federal research, monitoring, standard-setting and enforcement activities to ensure environmental protection. At the time of Bhopal gas leak, EPA was monitoring only 8 toxic chemicals and Methyl Isocyanate (MIC) was not one of them^[4].

The protection of employees on-site was regulated by Occupational Health and Safety Act, 1970 (OSHA). OSHA focussed only on on-site accidents. Another important legislation was the Toxic Substances Control Act, 1976 (TOSCA) which gave EPA power to track and monitor 75,000 chemicals produced or imported into US. EPA can impose a ban on manufacturing and importing of chemical that create unreasonable risk to human health.

1.3 US Legal Regime: Post Bhopal Gas Disaster

When Indians were busy counting losses Congress in US took major actions to prevent any similar chemical disaster in their country. Unlike India which had to focus on post disaster relief and legislative amendments, US had time and resources to plan for preventive policy and legislations. These legislations and regulation include the famous Emergency Planning and Community Right-to-Know Act of 1986 and Clean Air Act Amendment of 1990.

Small effort through signage system was also done post Bhopal accident. The US Department of Transportation which is primarily responsible for public protection against chemical leakages from trains, trucks, and aircraft developed a signage system for placarding transportation units that transport hazardous chemicals around the United States. At the time of the accident, these placards concentrated on flammability of MIC, and did not note MIC's hazard as a toxicant^[5].

Also what need mentioning here are steps undertaken by American chemical industry in response to the disaster by formation of Community Awareness & Emergency Response (CAER) program^[6]. It was drafted by the Chemical Manufacture Association (CMA) to strengthen emergency response planning in communities located near to chemical facilities. Under CAER, companies engage in dialogue with local people, police and emergency responders for coordinating emergency response training. Similar program existed prior to Bhopal incident in Canada as "Responsible Care" program^[7]. CMA in 1988 adopted the main guidelines of Responsible Care from Canada and made it mandatory for CMA members.

1.4 EPA Right-to-Know

In 1985, amidst the public criticism on disaster prevention policies the EPA in US started its Chemical Emergency Preparedness Program (CEPP). It was a voluntary program for

planning chemical emergency responses but many elements of it were incorporated by Congress through Emergency Planning and Community Right-to-Know Act, 1986 (EPCRA). EPCRA as the name suggests, is mainly responsible for promotion of information on hazardous facilities for better emergency planning. This emergency planning is done by states through State Emergency Response Commissions (SERC) and also requires local to form Local Emergency Planning Committees (LEPCs). In order to facilitate this planning process, chemical facilities are required to share information about hazardous chemicals at their facility and any other information necessary for emergency planning to LEPCs, SERCs and local authorities.

This is very crucial legislation in emergency preparedness of any disaster. In every sector of governance there is a constant recognition of decentralisation as an effective method which requires local community participation. This participation of local communities and state authorities in disaster management was recognised by Congress through EPCRA. The foundation of EPCRA is information dissemination because disaster management requires appreciation of scientific data which local communities may not have expertise or resources to collect themselves.

1.5 Toxic Release Inventory (TRI)

EPCRA under section 313 established the Toxics Release Inventory program which requires facilities to report annually to the EPA, the quantity of emissions of toxic chemical which pose threat to human life or environment. TRI data is very important in making informed decision on disaster preparedness as it gives an estimate of amount of toxic released via air, water and land on an annual basis^[8]. TRI data since it is in public domain, creates positive check and provides incentive for companies to monitor and improve their environmental performance.

But not all industries are covered under this TRI program, and it is generally larger facilities like mining, chemical manufacturing etc. which fall under this category. For any non-compliance of TRI, the liability is civil in nature, which critics point is not deterrent as large facilities get away with fines. Also, what needs to be pointed out that within larger facilities smaller separate facilities are created for manufacturing toxic chemicals which then get exempted from this because of their separate legal existence^[9].

1.6 Clean Air Act Amendment of 1990 PSM Standards

Clean Air Act Amendment (CAAA) of 1990 was brought a direct outcome of response to the accident in Bhopal and related incidents that had occurred in the United States. It required under section 304 of CAAA, Occupational Safety and Health Administration (OSHA) to frame emergency response guidelines for protecting workers at hazardous chemical facilities. OSHA developed the Process Safety Management (PSM) standards, which contains requirements for the management of hazards associated with processes using highly hazardous chemicals^[10].

It is the most comprehensive law dealing directly with chemical industry. The purpose of these rules was to minimise the effect of any catastrophic release of toxics. PSM rules are

mandatory for facilities which store or use “highly hazardous chemicals” more than a threshold level as prescribed by OSHA. For example MIC’s threshold quantity is 250 lbs. Before these rules came into force the chemical industries were deciding their own process and safety policy. Therefore, these policies varied from one facility to another. These standards have proven to be successful because state provided extensive training and support in implementing these standards.

RMP Standards

Section 112(r) (7) of CAA called for EPA to develop regulations for off-site damages to human or environment by chemical facilities. EPA in 1996 promulgated the Risk Management Program regulations. It is similar to PSM standards of OSHA, and almost covers same chemical substances. Also, the accident prevention guidelines are similar, which include using written operating procedure, employee training, ensuring ongoing mechanical integrity of equipment etc. However, RMP only takes into account off-site impact whereas OSHA’s PSM regulated on-site impacts^[11].

It is generally misunderstood that any hazard that affect public would have similar effects on workers on-site, therefore PSM guidelines are sufficient since measures to protect workers will also protect the public. But, this is not true all time as any escape of toxic vapors to outside air might not affect employee inside the facility. Therefore, RMP guidelines are needed to analyze an estimated area from facility which might get affected by toxic release from facility^[12].

Another, achievement of RMP was that the data collected by EPA was made public. There was a protest from corporates that this might result in stealing of confidential business information for undue economic gains by competitors. This was sorted out by a tradeoff whereby provision was made that public cannot access data which is confidential business information, but other than that public may read, as well as copy information given under RMP guidelines. Also, there was demand to put these data online for easy access. But the government decided not to put it online, since there was a possible threat of targeting of these chemical facilities by terrorists and other chemicals.

Chemical Safety Board

The US Chemical Safety Board (CSB) was authorized under section 112(r) (6) of CAAA to investigate and advise EPA and OSHA in accidental releases from chemical facilities and became operational from 1998. The Congress legislative history states: “The principal role of the chemical safety board is to investigate accidents to determine the conditions and circumstances which led up to the event and to identify the cause or causes so that similar events might be prevented”. In order to make it independent body, Congress provided that no executive branch official or agency can direct the actions of the Board. Congress provided that the CSB’s investigative activities be completely independent of the rulemaking, inspection, and enforcement authorities of EPA and OSHA. Chemical hazards that were not addressed by EPA or OSHA were to be investigated by the Board. However, full independence of Board could not be achieved since it was

required to collaborate with other agencies during investigation.

However, the future of CSB is under threat because of US President Donald Trump has proposed its abolition through defunding. This has been supported by US industrial lobby which sees CSB as a threat. This proposal is one of the steps by Trump administration to reduce non-military expenditure, in order to increase defence budget. More, deaths and accidents are caused by chemical accidents in US than through their self-made “terrorism”, this is a fact which the present government of US need to understand well before tragedy like Bhopal in their country.

1.7 Identifying the Lacunas: Do India Need to Learn from America

In the previous and current part we studied in detail how Indian and American lawmakers responded to Bhopal tragedy. Now, we will make an attempt in doing comparative analysis to find the lacunas which India needs to address in chemical disaster management. Prima facie reading of foregoing amendments in law brought after Bhopal points out that approach taken by US was more of precautionary while that of India was compensatory. This stark difference in approach was result of the fact that Indian Government had to address the crisis at hand and hence had to focus more on post-disaster relief legislations.

US has well developed jurisprudence in tort and civil liability was not worried about post disaster compensation issues, whereas Indian Government had to enact various laws to address the same. In India, class action suits jurisprudence is not developed yet, therefore after Bhopal Disaster various question regarding jurisdiction and multiple claims arose. Indian government responded by passing the Bhopal Gas Leak Disaster (Processing of Claims) Act, 1985 to confer on Central Government exclusive right to file claim for the Bhopal gas leak. The act was requirement of the moment, but more than thirty years later tort jurisprudence on industrial hazards has not been developed for class action suits. This leaves people at misery of government. Two other legislations passed in this regard were Public Liability Insurance Act, 1991 and National Environment Tribunal Act, 1995. The former failed to do justice by limiting the liability while latter never came into force and had to be replaced by National Green Tribunal Act, 2010. I am not even making an attempt to decode the Supreme Court timeline on Bhopal gas leak because it was a legal disaster, which can be a subject of doctorate if I start writing.

Now, coming to comparing the developments that took place for preventing such industrial hazards in future through pre-disaster preparedness. This is where one can identify most lacunas in Indian legal regime. The only prominent step taken was enacting the Disaster Management Act in 2005, which is twenty years after Bhopal disaster. I can understand Indian Government was too busy collecting ashes post Bhopal and hence could not focus on pre-disaster legal regime, but twenty years could have produced twenty more Bhopal in this country. Several other steps were taken through amendment in Factories Act, 1948 and enacting umbrella legislation the

Environment Protection Act, 1986, for protecting environment which we have discussed in previous part.

Environment Protection Act, 1986 I would say is most successful step taken so far in industrial disaster protection. But what all these legislation lack is community involvement and awareness through information dissemination. The most notable step of US as we noted was passing ECPRA, which provides for local community involvement in disaster mitigation through access to information about chemical facilities. In India, disaster prevention is all bureaucratic work without people involvement, which only creates a lack of trust among people about working of industries and government. Access to credible information is the foundation for any planning relating to disaster management preparedness.

America through PSM and RMP standards lays down minimum guidelines to be followed by industries dealing in prescribed hazardous chemicals. On this front also, India has taken no action for regulation process of industries. One argument for this approach is that India is a developing country and prescribing such standards will only increase the cost of production. But, those people who make this economic argument I think fail to do cost benefit analysis of Bhopal gas disaster. Also, disaster management especially in developing countries like India is undermined by these economic calculations of prescribing strict regulations. It may sound like dramatization to many but human suffering can't be put into simple monetary values, hence can't be compromised for pure economic policies of India today like "Make in India", which pose great threat in absence of strong well developed legal regime in industrial disaster management.

2. Nuclear disaster management: comparative analysis of legal systems post Fukushima

2.1 Whether Natural or Man-Made Disaster

When the Great East Japan Earthquake hit the Fukushima nuclear plants on March 11, 2011, it disabled the power supply for pumps necessary to cool reactors, causing a meltdown and radioactive releases. Tokyo Electric Power Company (TEPCO) was operating these nuclear power plants. The radioactive materials were released into the atmosphere making large area nearby the nuclear plants uninhabitable. It forced approximately evacuation of up to 100,000 residents and was the biggest disaster since the Chernobyl disaster in 1986. Unlike Chernobyl and Three Mile Island, nuclear radiation was started by natural disasters^[14].

Japan which is prone to earthquakes was not prepared for this nuclear disaster which the Prime Minister Yoshihiko Noda compared to "the ashes and desolation of World War II"^[15]. After the disaster, Japan amended many laws to not only rehabilitate victims but to reexamine nuclear power plants safety. This paper discusses man-made disasters, so one might ask why discussion over an earthquake or tsunami in Japan. It is because the various studies conducted have pointed that design, safety and response systems might have decreased the amount of radioactive release from plant. Even a remark was made by Mr. Kiyoshi Kurokawa, chairman of Fukushima Nuclear Accident Independent Investigation Commission that "It was a profoundly man-made disaster - that could and should have been foreseen and prevented"^[16].

2.2 India's Nuclear Status: Why India Needs to Learn from Fukushima

It is highly important for India which has a flourishing and mainly indigenous nuclear plant to learn from legal developments around the world post Fukushima. India is expected to have nuclear capacity of 2000 MW by the year 2020 and approximately 63000 MW by 2032. India aims to meet one-fourth of its electricity requirements through nuclear power plants by the end of 2050. This vision to become nuclear power in world has its origin in India's expertise in fast nuclear reactors and thorium fuel cycle. The Atomic Energy Commission officials are of the view that nuclear power only can provide the country long term energy security^[17]. All these "beautiful" statistics of India becoming a nuclear power have a hidden warning which needs to be addressed and Fukushima nuclear disaster was a lesson especially for developing countries like India which see their energy sector future in nuclear technology.

India like Japan and other states has a set of emergency guidelines and plans around each nuclear facility. All these emergency plans look similar. Whether it is India or Japan, these plans essentially fail in adopting lessons learnt from Chernobyl or Fukushima. So, it becomes highly relevant to review and compare how different legal systems have responded to Fukushima. But, comparing Indian nuclear disaster management is highly difficult in light of lack of documentation and also, majority of nuclear plants in India have not made their disaster management plans online.

2.3 Post Fukushima: How Japan and Other Legal Systems Responded

The legal system in Japan was not prepared for an accident as severe as Fukushima. Evacuation and food standards were brought into action only after the disaster. There were no specific countermeasures in laws governing nuclear power for addressing loss of life and damage. These laws were improvised in a hurry to address the crisis at moment and hence lacked foresight. We will discuss the actions taken on different fronts by legislative amendments, executive orders etc. by the government. Also, we will examine in detail how nuclear emergency response system was put into action and particularly the issues relating to evacuation, food supply and information dissemination. This analysis will be comparative with more focus on India's nuclear emergency preparedness status.

Conflict Of Interest

▪ Japan

In 1999, when the Japan Nuclear Fuel Conversion Company accident happened, Agency for Natural Resource and Energy (ANRE) which was under Ministry of Economy, Trade and Industry (METI) lost its jurisdiction to govern nuclear safety. This step was taken as ANRE was found to be promoting nuclear energy rather impartially regulating it^[18]. So, when criticism grew, Japan Government decided to reform the nuclear safety regime by separating nuclear promotion and regulation agencies, but intentionally or unintentionally they created similar institution. Nuclear safety was entrusted to Nuclear and Industrial Safety Agency (NISA) for regulating

nuclear facilities, but in actuality, NISA was a METI agency. Long story short, no independence was achieved through this spin-off of agencies.

When the Fukushima disaster happened, public started demanding again independence and transparency of regulating nuclear agency. This time, the blow was so severe to Japan that it could not help but take serious actions. So, in 2012, Nuclear Regulatory Commission (NRC) was established as an external agency to the Ministry of the Environment in order to bring more transparency and accountability in nuclear safety regime [19]. This step was also in furtherance of obligation under Convention on Nuclear Safety, 1994 (CNS) which under article 8 demands separation of nuclear promoting and regulatory agencies. Japan was a party to this convention since 1995, but it took two nuclear disasters to wake them from sleep. I don't know how many will India need.

▪ India

The Government of India has made Department of Atomic Energy (DAE) responsible for providing the necessary resources to the local or national authorities for responding to any nuclear disaster. DAE administers the Nuclear Power Corporation of India Limited (NPCIL) operating commercial nuclear plants. There is a flagrant conflict of interest for DAE: protection of interest of population versus protection of the economic interests of nuclear industry. This obligation is also international since India also has ratified the Convention on Nuclear Safety in 2005 [20]. Also, what needs to be highlighted is that India has ratified CNS, hence has the obligation under international law for separation of nuclear regulating agencies.

Suggestion

Indian government should separate the protection of the population from the nuclear industry by creating an independent organization in charge of safety, radiation protection and expertise. This separation of responsibility is *sine qua non* in disaster management.

Emergency Planning Zones

▪ Japan

Protective actions of the population living around a nuclear facility are designed to decrease the exposure to radiations to radiations. One of important issue in regard to radiation protection, is up to what distance from nuclear plants should the people be informed, trained and prepared for worse? In Japan in 2011, inappropriate size of Emergency Planning Zone (EPZ) hampered evacuation and lead to confusing decisions as they failed to learn from accident like Chernobyl [21].

The Fukushima Nuclear Accident Independent Investigation Commission of National Diet of Japan writes "Fukushima Prefecture, acting on its own accord, issued an evacuation order for residents within 2 km of plant. This 2 km radius was chosen as the bare minimum distance considering the 2 km evacuation radius used for residents in past nuclear emergency drills." The evacuation order was then later extended to 10 km and 20 km from the nuclear plants. "A 10km radius was chosen simply because it was maximum area for an Emergency Planning Zone (EPZ) as set out in Disaster Management Plan; it was not decided on the basis of any

concrete calculations or rational grounds. As for the 20 km-radius evacuation zone, due to the progression of situation, a radius of 20 km was decided upon simply because of some people's subjective opinions. This can be hardly called a rational decision [22]."

As a consequence, the new guidelines of Japanese Nuclear Regulation Agency define a Precautionary Action Zone with a radius of 5 km and with immediate evacuation in case of general nuclear emergency, an Urgent Protective action Planning Zone between radii of 5 to 30 km with protective action depending on severity of accident. There is also Plume Protection Planning Area between radii of 30 to 50 km where iodine tablets are available and where protective action might be taken if necessary [23]. However, many issues which need addressing are preparedness for evacuating persons which owing to health or other conditions can't evacuate themselves.

▪ India

India's Disaster Management Guidelines [24] mention an exclusion zone with a radius of 1.6 km in which no habitation is permitted and a sterilized zone with a radius of 5 km around nuclear plants where human activities are to be regulated. The emergency plan of the Atomic Energy Regulatory Board [25] requires information about demographic characteristics up to 16 km. The latter is considered as the EPZ.

The emergency preparedness manual for Kakrapur nuclear power station [26] revised after the Fukushima disaster states that the plan is defined "up to a distance of 16 km. even in the event of an off-site emergency it is quite unlikely that radioactive materials will spread beyond 16.0 km distance. However if situation demands, the preparedness plan can be extended beyond the 16 km distance also". However, besides this statement, there is no clear plan for implementing emergency measures beyond the 16 km distance. This clearly shows that India has failed to learn the lesson from Japan in regard to emergency planning zones.

Suggestion

In context of developments in Japan India needs to update its guidelines. Emergency planning zone around nuclear power plants should be expanded up to 30 km of nuclear power plants. Preparation and information of the populations is also necessary beyond this limit up to 100 km. This is necessary considering Indian demographics whereby the chances of any radiation travelling large distance is possible.

Iodine Prophylaxis

▪ Japan

In Japan, the Fukushima Medical University has screened the thyroid of 368, 00 children in Fukushima prefecture. As of the 31st December 2015, after a first echography, 100 children were found to have developed a thyroid cancer confirmed by surgery. Japanese Authority keeps on claiming that it is not due to the nuclear disaster. But experts claim that there are high chances that these children could have lived several years with their thyroid gland [27].

There is an overwhelming agreement that radioactive iodine released during a nuclear accident is the main cause of increase of thyroid cancers among young people [28]. In Poland, thanks to iodine administration in the following days

of the Chernobyl disaster, no increase of occurrence of thyroid cancer was observed. On the contrary, in Belarus where iodine prophylaxis was not implemented, a 100 fold increase of this cancer was observed among children following the Chernobyl accident^[29].

Japan before Fukushima disaster had stockpiles of iodine tablets stored locally, but the government's nuclear emergency support system failed to give proper instructions to people. Consequently very few people in surrounding area took them. Japan nuclear regulators later changed their policy and advise prior distribution of iodine prophylaxis within the EPZ with radius of 30 km. It should be considered in the plume protection planning area of 50 km^[30].

▪ **India**

In India some manuals on emergency preparedness list number of available iodine tablets in shelters, however the quantity is not found to be adequate. Around Kaiga nuclear plant, for example, the number of available tablets is lower than shelter capacity. This raises secondary question of who is to be given priority if ever such accident happens and tablets have to be administered. There is no mention in any manual on disaster preparedness about this^[31].

Suggestion

The cost of providing iodine tablets is much lower than treating any case of thyroid cancer arising in future by nuclear radiation. In light of this I recommend Indian authorities should hand out iodine tablets to population with adequate information up to 100 km around nuclear power plants.

Radioactive Contamination of Foodstuff

▪ **Japan**

The most crucial issue for eliminating or decreasing the exposure of residents to radiation is how to prevent ingestion of food contaminated with radioactive materials. After the Fukushima crisis higher radiation levels in food products produced near plants was detected^[32]. At that time Japan had no legally binding standards in levels of radiation in food items. There was a provision under Food Sanitation Act, 1947 however to prohibit sale or use of food products harmful for human consumption. Later on, Ministry of Health, Labor and Welfare (MHLW) in October, 2011 issued a notice specifying provisional standard values of radiation levels in food. Food items with radiation level above the prescribed limits came under Article 6 of the Food Sanitation Act which provided shipping restrictions by the government.

In Japan food restriction were introduced when measurements showed that some items were contaminated. As all the food could not be monitored quickly, such an approach led to many failures. As a result, citizens began to distrust safety of food items and market price of food items labeled "made in Fukushima" dipped more than one-fourth of previous years^[33].

▪ **India**

No specific strategy is outlined in the Indian guidelines regarding food and water monitoring. International recommendations about concentration of radio nuclides in foodstuffs are given in the Codex Alimentarius of the Food and

Agriculture Organization and World Health Organization^[34]. Let's only compare radioactive cesium and iodine for comparison. The Guideline Level of the Codex Alimentarius for cesium is 1000 Bq/kg and 100 Bq/kg for iodine. Japan, soon after Fukushima, fixed the level at 200 Bq/kg for dairy products and 500 Bq/kg for other food products. These levels were decreased later on to gain consumer confidence. However, Indian AERB considers a radiological parameter in case of contamination with radiocesium for initiating the countermeasures that range between 8000 Bq/kg in meat to 90,000 Bq/kg in fruits and vegetables^[35]. The numbers speak for themselves about Indian position on radioactive contamination of food.

Suggestions

Indian values are far too high compared to international standards which cannot be ignored up by Indian authorities and hence there is need for elaborate strategy about foodstuff and water contamination in case of any nuclear accident.

Compensation

▪ **Japan**

The liability for nuclear disasters is given under the Compensation for Nuclear Damage Act, 1961 (Compensation Act) which prescribes only stipulate general liability without referring to any specific standards. After Fukushima accident, a Dispute Reconciliation Committee was created to settle dispute between victims and plant operators as per Article 18 of the Compensation Act. Various guidelines were issued from time to time for damages arising from evacuation orders, mental agony caused by being forced to live as evacuee etc. It took a lot of time to frame appropriate standards as before Fukushima accident there was no jurisprudence on this subject.

▪ **India**

Indian position on compensation under the Civil Liability for Nuclear Damage Act, 2010 is highly debated one. This Act was introduced as part of Indo-US Nuclear deal to provide for liability of operators in case of any nuclear accident. This Act follows no-fault liability principle and provides for compensation of nuclear accident, which however is limited. One of the debated provisions is section 17(b) which provides for liability of supplier in case of any nuclear accident. This is very crucial for India since it relies heavily on imported nuclear reactors. In India all nuclear plants are owned by Government of India, so if tomorrow some tragedy happens the compensation will be paid from tax money of citizens only. So, retaining this provision is very crucial, because if accident is due to faulty technology of foreign supplier he should be made liable. But, then this liability of supplier also is limited to only meager sum of 15 billion, and this right to recourse lies only to contractor which is Government of India and not victims.

Government of India has ratified a global regime called the Convention on Supplementary Compensation for Nuclear Damage, 1997 which removes liability of supplier. Now, developed countries like USA are pushing for amending nuclear liability laws in conformity with the convention. This is because they are the exporters of nuclear reactors and want

to avoid any liability for any nuclear accident.

Information to People

▪ Japan

Immediate warning of the population together with means of communication relevant information is a prerequisite of any emergency plan. Japanese NAIIC writes in its report: "Detailed accuracy was made a priority, at the expense of quickly getting the information to those who needed it for informed decisions. Mr. Edano the Cabinet Secretary repeatedly stated that there were no immediate health effects from the release of radiation, giving public a false sense of security [36]". Japan population used social media platforms after the earthquake to communicate and confirm personal security. But, with the flood of information through social media, Japan's public became more confused and anxious. Thus it was recognized that despite strong communications channels in Japan, there was no proper channel to receive official and accurate information.

▪ India

Department of Atomic Energy has categorized nuclear power plants accident and emergencies as on site emergencies and offsite emergencies. Only in off-site emergency is the local authorities informed. Indian NDMA notes that a reliable communication infrastructure is one of the key elements in any response mechanism. Presently, the communication linkage from the district to the state headquarters and then to the national level is neither dedicated nor adequate [37].

Finally, for large-scale emergencies, there may be international consequences as pointed out by the ICRP. "These may result from international trade and concerns that produce/trade items may be contaminated: the perceived need for protective measures in other countries and therefore the need to harmonize the response across country borders...It is important that national authorities ensure effective international communication with authorities, particularly in countries that could be affected in the event of an emergency [38]."

Suggestion

Indian authorities should reconsider their communication policy in case of an emergency to be sure the information is delivered to authorities at all levels including the local communities. This requires strong integration between different departments involved in relief post disaster, along with infrastructure to support it.

Conclusion

We have studied in previous parts in detail about how different countries responded to man-made disasters and the challenges faced by them. Also, we have made comparative analysis of legal regimes to find the gaps from lessons learnt in Bhopal and Fukushima. At the heart of these suggestions lies the need to recognise the potential damage of any man-made activity not only on humans but environment at large. Till now, we focussed only on country specific approach but this approach is not enough since disasters create a transnational impact and hence should be addressed by global framework. This global framework has its justification in the

environment impact of each man-made disaster which is not highlighted and is over shadowed by human sufferings during these disasters.

Also, we studied in depth that how developing countries are shy of taking preventive disaster management steps because of economic considerations. Most actions are taken on building support systems post disaster, as was in the case of India after Bhopal Gas Tragedy. Whereas we saw how US took more steps on pre-disaster front and hence was able to industrial disaster in the country. Since, in previous part's suggestions specific to each stage of disaster have been mentioned what needs to be highlighted now is fundamental challenges and solutions. The first fundamental challenge lies in anthropocentric view of addressing disaster management issues. This view sees humans as the only victims of man-made disasters and doesn't consider into environment costs. The result of which is "tragedy of commons". The man-made disasters result from profit making human activities which have limited beneficiaries and unlimited cost bearers. This cost-benefit analysis gives incentive to externalise cost of business through poor safety regulation in facilities handling hazardous activities. This can only be remedied by factoring environment cost in policy making as damage done to it can't always be compensated by monetary fines.

Second major issue is non-uniformity of approach and standards in disaster management. This gives safe-haven to industries by shifting the burden to developing countries. This was even pointed out by a leaked memo of World Bank from the pen of Lawrence Summers. That memo exposed what is existing today as "toxic colonisation". Developing countries keep their regulatory regime lenient and not par with international standards so as to reduce cost of manufacturing in their country. This approach is disastrous as was seen in Bhopal Gas Tragedy. India in order to keep the cost of pesticide low kept these chemical industries running under poor regulatory regime. Therefore, there is a dire need to bring in uniformity in regulatory regimes of hazardous industries. This uniformity in regulation and disaster management policies is the inevitable need of globalised world where inequalities of economy create man-made disasters in name of "development".

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